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TOWARDS A THEORETICAL UNDERSTANDING OF THE GREEN TRANSFORMATION OF THE FINANCIAL SYSTEM AS A TOOL FOR ACHIEVING SUSTAINABLE DEVELOPMENT AND REDUCING FINANCIAL RISKS ASSOCIATED WITH ENVIRONMENTAL PROBLEMS

НА ШЛЯХУ ДО ТЕОРЕТИЧНОГО ОСМИСЛЕННЯ ЗЕЛЕНОЇ ТРАНСФОРМАЦІЇ ФІНАНСОВОЇ СИСТЕМИ ЯК ІНСТРУМЕНТА ДОСЯГНЕННЯ СТАЛОГО РОЗВИТКУ І ЗНИЖЕННЯ ФІНАНСОВИХ РИЗИКІВ, ПОВ'ЯЗАНИХ З ЕКОЛОГІЧНИМИ ПРОБЛЕМАМИ

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Abstract. *The purpose of the article is to analyze conceptual and theoretical approaches to the study of the financial system in the context of its imperative greening against the background of developing institutional tools to combat climate change and environmental crises that affect the riskiness of the international trade and international finance system. The ambiguity of the category of "green finance" is confirmed by the fact of the existence of disparate and uncoordinated taxonomies of sustainability, which complicates the interaction of green initiatives on an international scale. The need for a revision of economic theories based on the concept of ultimate growth without taking into account the qualitative characteristics of the latter becomes obvious. The alternative is the concept of degrowth, which forces us to rethink the balance of economic, environmental and social interests of many stakeholders. It has been established that in the professional literature on degrowth models, the phenomenon of finance is either ignored or demonized. At the same time, at the meta-level of international economic policy, the climate agenda is being institutionalized, which aims to form a consolidated approach to recognizing the need for greening the financial system, which requires a clear definition of the potential and boundaries of greening its structural links. We identify institutional, financial, technical, and psychological obstacles to the implementation of a sustainable and green agenda, while, depending on the focus of the analysis, the risks inherent in the green and energy transition are modified - physical risks, transition risks, and liability risks. The risk-oriented approach on which the modern financial supervision system is based distinguishes liquidity risk, credit risk, market risk, and operational risk. Climate change puts pressure on the outlined risks, which complicates the attraction of financial resources. The lack of unified approaches to identifying the "green attribute" of the financial market leads to manipulation of the green agenda in order to accumulate financial resources that will be directed for other purposes. The demand for the formation of a new perception of the economy in the context of sustainable development becomes obvious, which is served by the concepts of the blue economy, green economy, bioeconomy, degrowth economy, circular economy, low-carbon economy and green growth economy. The article identifies the subjects of green financing. The role of the state in financial support of green initiatives is noted. The impact of climate change on the sectors of the financial market is emphasized - the insurance*

market, the banking services market, the collective investment market, the foreign exchange market, the payment services market, the precious metals market, which will adapt green instruments to their work. The special role of the carbon market and system of trading quotas for greenhouse gas emissions in the functioning of the global climate agenda system and in encouraging the development of the green segment of the financial system is substantiated. Green finance is considered as a complex of economic relations, which involved the analysis of economic theories that appeal to sustainability. This allowed establishing the leading role of financial institutions in the fight against environmental crises. Investment projects that involve financing sustainable and responsible climate development are recognized as a source of reducing financial risks associated with the destructive consequences of climate change.

Keywords: *global market for green financial instruments, international green financial system, financial instruments, financial institutions, financial market, institutional investor, green economy, bioeconomy, responsible investment, green banking, green insurance, energy efficiency, system of trading quotas for greenhouse gas emissions, crisis, risks, financial-climate risks, ESG regulation, economic theories, degrowth theory, green finance theories.*

Анотація. *Мета статті полягає в аналізі концептуальних і теоретичних підходів до дослідження фінансової системи в контексті її імперативного озеленення на тлі вироблення інституційного інструментарію протидії кліматичним змінам і екологічним кризам, що впливають на ризикогенність системи міжнародної торгівлі і міжнародних фінансів. Неоднозначність категорії «зелені фінанси» підтверджується фактом існування розрізнених і декоординованих між собою таксономій сталості, що ускладнює взаємодію зелених ініціатив у міжнародному масштабі. Стає очевидним затребуваність ревізії економічних теорій, що базуються на концепції ультимативного зростання без врахування якісних характеристик останнього. Альтернативою виступає концепція антиросту, що змушує переосмислити баланс економічних, екологічних та соціальних інтересів багатьох стейкхолдерів. Встановлено, що у фаховій літературі про моделі антизростання феномен фінансів або ігнорується, або демонізується. При цьому на метарівні міжнародної економічної політики відбувається інституціоналізція кліматичної адженди, що ставить за мету формування консолідованого підходу до визнання затребуваності озеленення фінансової системи, що вимагає чіткого визначення потенціалу і меж озеленення її структурних ланок. Ми виокремлюємо інституційні, фінансові, технічні, психологічні перешкоди на шляху реалізації сталої й зеленої адженди, при цьому, залежно від фокусу аналізу, модифікуються іманентні зеленому і енергетичному переходу ризики – фізичні ризики, ризики перехідного періоду, ризики відповідальності. Ризик-орієнтований підхід, на якому базується сучасна система фінансового нагляду, виокремлює ризик ліквідності, кредитний ризик, ринковий ризик, операційний ризик. Кліматичні зміни чинять тиск на окреслені ризики, що ускладнює залучення фінансових ресурсів. Відсутність єдиних підходів до виокремлення «зеленого атрибуту» фінансового ринку призводить до маніпуляції зеленою аджендою задля акумулювання фінансових ресурсів, що спрямовуватимуться не за призначенням. Очевидним стає запит на формування нового сприйняття економіки в контексті сталого розвитку, чому слугують концепції синьої економіки, зеленої економіки, біоекономіки, економіки антиросту, циркулярної економіки, низьковуглецевої економіки, економіки зеленого росту. В статті виокремлено суб'єкти зеленого фінансування. Відзначена роль держави в фінансовому супроводі зелених ініціатив. Наголошено на впливі кліматичних змін на сектори фінансового ринку – страховий ринок, ринок банківських послуг, ринок колективних інвестицій, валютний ринок, ринок платіжних послуг, ринок дорогоцінних металів, що адаптуватимуть зелені інструменти в свою роботу. Обґрунтовано особливу роль вуглецевого ринку і системи торгівлі квотами у функціонуванні світової системи кліматичної адженди і в заохоченні розвитку зеленого сегменту фінансової системи. Зелені фінанси розглянуто як комплекс економічних відносин, що*

передбачало аналіз економічних теорій, що апелюють до сталості. Це дозволило встановити провідну роль фінансових інститутів у боротьбі з екологічними кризами. Інвестиційні проєкти, що передбачають фінансування сталого і відповідального кліматичного розвитку, визнані джерелом скорочення фінансових ризиків, пов'язаних із руйнівними наслідками кліматичних змін.

***Ключові слова**: глобальний ринок зелених фінансових інструментів, міжнародна зелена фінансова система, фінансові інструменти, фінансові інститути, фінансовий ринок, інституційний інвестор, зелена економіка, біоекономіка, відповідальне інвестування, зелений банкінг, зелене страхування, енергоефективність, торгівля квотами, торгівля викидами, криза, ризики, фінансово-кліматичні ризики, ESG-регулювання, економічні теорії, теорія антиросту, теорії зелених фінансів.*

Introduction. The global green finance market is currently characterized by a growing interest of private financial institutions in sustainable development issues. Global financial centers are showing particular interest in environmental programs. Stock exchanges are launching their sustainable finance initiatives. Cooperation between the largest financial centers is expected to facilitate the exchange of best practices and ensure convergence of key principles and dimensions in the direction of sustainable development. The role of non-profit organizations aimed at disseminating environmental practices in the business environment is increasing. Financing climate initiatives is an integral and key driving force in achieving the goals set by the Paris Agreement. Two main components: financing measures to prevent the effects of climate change (use of renewable energy, application of new equipment and technologies, such as electric vehicles, adjust existing norms and habits of people), financing adaptation measures (construction of flood protection structures, creation of early warning systems for cyclones, transition to the cultivation of drought-resistant crops, repurposing of communication systems, commercial activities and public administration).

The development of green financial instruments is directly related to the strengthening of "green" challenges (natural resource, climate, ecological), which include: the creation of a new useful quality in the form of environmentally friendly goods, services and programs for maintaining the environment (for example, "green" products and materials, construction and transport, forest plantations, etc.); increasing the efficiency of using renewable and non-renewable energy sources; reducing the negative impact of human activity on the environment (mitigation); supervision and management of hydrocarbon emissions; recycling and disposal of waste; control and regulation of industrial pollution; water supply, sanitation and hygiene; climate change adaptation.

The Global Risks Report in 2023 uses a new term: polycrisis. A polycrisis is a situation where various risks intersect and their interdependence is felt very acutely. A polycrisis is a cluster of related global risks with compounding effects, such that the overall impact exceeds the sum of each part" *(World economic forum, 2023)*. "Traditional" risks – inflation, cost of living crisis, trade wars, large-scale social unrest, geopolitical confrontation and the threat of nuclear war – have been supplemented by relatively new risks – high levels of public debt, a new era of low growth, low investment and deglobalization, a slowdown in human development after decades of progress, rapid and unlimited development of dual-use technologies, growing pressure from the consequences of climate change with an ever-narrowing window of opportunity to mitigate these changes. All these risks are converging in the coming decade, making it unique in its level of uncertainty and turbulence – a decade of polycrisis.

Despite the existing body of work by authors who reveal the essence of the finance, the ambiguity of the category of "green finance", which is confirmed by many taxonomies of sustainability, complicates the coordination of green initiatives on an international scale *(Melnyk, T., Reznikova, N., & Ivashchenko, O., 2020)*. It becomes obvious that there is a need to revise

economic theories based on the concept of economic growth, the alternative to which is the concept of degrowth, which forces us to rethink the balance of economic, environmental and social interests of many stakeholders.

The purpose of the article. The purpose of the article is to analyze conceptual and theoretical approaches to the study of the financial system in the context of its imperative greening against the background of developing institutional tools to combat climate change and environmental crises that affect the riskiness of the system of international trade and international finance.

Literature review. The state of the global climate and environment has a direct impact on ensuring continuous economic development. In the proposed "integrated assessment model" W. D. Nordhaus actually combined the models of economic growth and climate change (*Nordhaus, W.D., 1977)*. The essence of the model of W. D. Nordhaus is that the total volume of use of natural resources corresponds to a certain volume of greenhouse gas emissions, which affect the average air temperature. In turn, the air temperature determines the multiplier corresponding to environmental damage. As a result, the total productivity of production factors falls due to environmental damage, which ultimately worsens the well-being of the population, suppresses economic growth and the development of human capital. These consequences can be avoided only by ensuring conditions for sustainable economic development and the transition to a "green economy" *(Khoshnava, S. M., Rostami, R., Zin, R. M., Štreimikiene, D., Yousefpour, A., Strielkowski, W., et al., 2019)*. The imperative greening of financial system has found itself in the research perspective of Ukrainian scientists (*Grod, M., & Reznikova, N., 2023; Zablotska, R. O., & Rusak, D. M., 2024; Orlovska, Yu. V., Chala, V. S., & Varlamova, O. A., 2016; Ptashchenko, O. V., & Arkhipova, D. Ye., 2020; Ptashchenko, O., 2024; Reznikova, N. V., & Grod, M. I., 2023; Farenyuk, N. V., 2024; Tsybuliak, A. H., 2015; Tsybuliak, A. H,. 2016; Tsybuliak, A. H., 2017)*. The ambiguous consequences of climate change on economic relations are highlighted in the works of V. Chala *(Chala, V., 2022)*, Yu. Orlovska *(Chala V., & Orlovska, Yu. 2022)*, B. Dalal-Clayton, S. Bass *(Dalal-Clayton, B., & Bass, S., 2009)*, M. Medvedieva, R. Yedeliev, A. Nanavov, G. Grydasova *(Medvedieva, M., Yedeliev, R., Reznikova, N., Nanavov, A., & Grydasova, G., 2024)*, N. Reznikova, M. Rubtsova *(Reznikova, N., Ivashchenko, O., Rubtsova, M., 2020)*, V. Panchenko V. Karp, S. Stakhurska *(Reznikova, N., Panchenko, V., Karp, V., Grod, M., Stakhurska, S., 2024)*, M. Grod *(Grod, M., & Reznikova, N., 2023a; Grod, M., & Reznikova, N., 2023b)*, O. Ptashchenko *(Ptashchenko, O. V., & Arkhipova, D. Ye., 2020; Ptashchenko O.V., 2018; Ptashchenko, O. V., Shersheniuk, O. M., 2023)*. Financing green initiatives is related to the problem of targeted finance. As international financial markets expand and international trade volumes increase, as noted by S. Murau, A. Haas, A. Guter-Sandu *(Murau, S., Haas, A. & Guter-Sandu, A., 2024)*, R.L. Wray *(Wray, R.L., 2012)*, O.E. Wright *(Wright, O.E., 2013)*, they require more and more money to ensure their financing, which makes modern finance a key mechanism for implementing the green and energy transition. Scholars agree with the thesis that finance has now become an autonomous market with its own interests. Due to its scale, finance has become a risk for the economy as a whole with potentially catastrophic social (the global financial crisis of 2007-2008) and environmental consequences. In the literature on degrowth models, the phenomenon of finance is either ignored or demonized. At the same time, at the level of international organizations, at the meta-level of international economic policy, the climate agenda is being institutionalized, which aims to form a consolidated approach to recognizing the need for greening the financial system *(United Nations Framework Convention on Climate Change, 2018; United Nations Environment Programme, 2023; UNFCCC, 2021)*.

The main material of the article. According to existing approaches to identifying financial and climate risks that affect the global financial system, physical risks, transition risks, and liability risks are determined. Physical risks correlate with the physical consequences of climate change. Physical risks are divided into acute and chronic. Acute risks arise from serious one-time cataclysms, including hurricanes, floods, volcanic eruptions, etc. Chronic risks include risks caused by climate change over a long period of time. These include drought, lack of water and food, etc. Physical risks have a negative impact on the condition and activities of households. For

example, damage to assets may be caused and indirect consequences of destabilization of supply chains may be observed. Transition risks are associated with the transition to a more sustainable economy and may affect the value of various assets in financial markets. Transition risks are associated with regulatory and technological changes. For example, greening of consumption may lead to an increase in prices for raw materials. Medium-term risks can have financial implications for organizations, such as asset shortages and high operating costs.

Liability risks are closely intertwined with the threats of the above-mentioned risks. A situation is developing where individuals and legal entities are trying to compensate for their losses through lawsuits. In doing so, they also express dissatisfaction with innovative standards for reducing the impact of climate change. The risk that the global financial sector will become a field for litigation is becoming too great. The modern system of regulation and supervision in the financial market is based on a risk-oriented approach, the essence of which is that the frequency and intensity of supervisory measures depend on the identified risks of financial institutions. The activities of financial market entities are associated with credit, market and operational risks, liquidity risks, reputational risks, etc. Climate risks are increasingly being singled out in this series. It should be borne in mind that climate risks, on the one hand, form an independent type of risk in the financial market, and on the other, they affect other types of risks.

Climate change affects the main risks of financial institutions:

– **credit risk** – the risk of losses that a financial institution may incur due to the untimely or incomplete fulfillment of financial obligations by a counterparty due to climate-related emergencies;

– **market risk** – the risk of loss associated with a change in the market price of financial instruments (a decrease in the exchange rate and the value of securities of countries in which major environmental disasters of a natural or man-made nature have occurred can be expected);

– **operational risk** – the risk of losses arising as a result of non-compliance with the nature and scale of the financial institution's activities and (or) the requirements of current legislation of internal procedures and procedures for conducting financial transactions and other transactions, their violation by employees of the financial institution and (or) other persons, disproportion (insufficiency) of the functional capabilities (characteristics) of the information, technological and other systems used by the financial institution and (or) their failures (malfunctions), as well as as a result of the impact of external events.

– **risk of loss of business reputation** – risk of losses due to the creation of an unfavorable image (lack of “green” financial instruments in the arsenal of a financial institution, provision of financial services (insurance, lending) to persons representing non-ecological sectors of the economy, as well as the presence of such persons among the founders or shareholders of a financial institution may lead to the formation of a negative attitude towards the relevant financial institution among potential clients and a refusal to further cooperate with it *(Recommendations of the Task Force on Climate-related Financial Disclosures, 2017).*

Investments in green equity are mainly carried out through index investing or investing in equity funds. New green financial instruments are being formed, including: ETF funds (public investment funds, Exchange Traded Fund), which seek and acquire shares of companies aimed at solving climate, social issues, or implementing environmentally friendly products; green crowdfunding, collective investments of three persons to finance environmental projects; more specific lending products, such as green mortgages. Green bonds can be considered the most widely used instrument for stimulating investment in climate projects. The European Commission in a report devoted to the study of the content of the concept of "green" in the context of "green" finance, identified the following instruments for its formulation in official documents *(European Commission, 2017):*

1. Objectives. The basic approach to defining green is to specify the outcomes (e.g. climate change mitigation, sustainability, pollution prevention, etc.) that an activity must achieve in order to be considered green. This is followed by a case-by-case assessment of whether specific investments contribute to achieving such objectives.

2. Taxonomy. Green taxonomies are classifications of areas and investment objects (technologies, sectors, etc.) that are considered green. Taxonomies can have different levels, with each level serving to describe, in increasing detail, the elements that make up the top category.

3. Exclusion criteria. These are used to exclude certain sectors, companies, activities, etc. from the definition of green. Often, exclusion criteria identify specific technologies, such as nuclear power. Other forms of exclusion can be norm-based (i.e. excluding all investments that do not meet existing norms and standards).

4. Indicators. These are values used to indicate environmental performance or the impact of an activity (energy/water savings, greenhouse gas emissions reduction, etc.). Indicators may be set with thresholds or minimum acceptable performance levels and/or with targets illustrating the desired level of performance. Indicators may provide a retrospective or prospective measurement of performance (e.g. measuring overall water consumption).

5. Ratings. Allows an assessment of the degree of "greenness" of a firm, technology or financial product according to predetermined criteria.

"Green finance" in the relevant financial literature is considered in three main aspects: (1) a set of various methods of financing technological processes and projects in the field of greening economic activity; (2) a set of financial institutions (banks, insurance companies, etc.) involved in financing environmental programs and projects; (3) financial products and services with an environmental component. "Green" financing can be ranked: by source (private or public); by goals; by principles; by instruments ("green" bonds, "green" lending, index insurance, green crowdfunding, ETF funds); by decision-making levels. The OECD links "green" finance and instruments with "green development", meaning achieving economic growth while reducing pollution and greenhouse gas emissions, as well as minimizing waste and increasing the efficiency of natural resource use *(Finance and investment for environmental goals).*

The new vision of the economy in the context of sustainable development has given rise to such concepts as the blue economy, the green economy, the green growth economy, the bioeconomy, the circular economy, the low-carbon economy and the degrowth economy. Within the framework of the blue economy, the basis for sustainable development is also the infrastructure serving the fisheries and shipping, marine tourism, offshore hydrocarbon production, marine biotechnology, renewable energy sources, including tidal energy. According to the degrowth theory, in order to achieve sustainability, it is necessary to reduce the growth rate of both the global economy and specific countries. Achieving this goal is planned by reducing the level of GDP and resource consumption, reducing working hours and the capacity of the economy itself, as well as changing social values, from ethics to the role of money in the economy.

The concept of "green" growth is very close to the concept of the "green" economy and is widely used in the countries of the Organization for Economic Cooperation and Development. In this model, "green" growth is understood as economic growth that is efficient in terms of the use of natural resources, clean in terms of environmental impact and resilient in terms of natural disasters. A "green" economy is understood as a resource- and energy-efficient economy, the integral features of which are decarbonization, diversification and an inclusive social environment. As a result of the rapid development of biotechnology, the concept of bioeconomy has emerged, where renewable biological resources and materials are the basis for sustainable development *(EU, 2007; EC, 2012; Glatzel, K., Virchow, D., Musaazi, S. Nakitto, A., Niyonsenga, S., Babu, S., Srivastava, N., & Kashandula, P, 2024; Lopes, C. L., Corleto, A. F., & Chiavari, J., 2024).*

The widest scope of application of biotechnology gives this concept enormous potential to ensure not only economic benefits, but also a decent quality of life for people. World experience shows that the implementation of a strategic program for the development of the bioeconomy concept along with the green economy, which would take into account its specifics, significantly increases the chances of success in achieving sustainable growth. Even recognizing the potential of the bioeconomy in relation to the growth of environmental sustainability of modern economic systems, many doubt the success of its implementation. Green finance includes efforts to

internalize environmental externalities and adjust risk perception in order to increase environmentally friendly investments and reduce environmentally harmful investments. Green finance covers a wide range of financial institutions and asset classes and includes both public and private finance *(Murau, S., Haas, A. & Guter-Sandu, A., 2024).* Green finance includes effective management of environmental risks in the financial system. Green finance instruments within the framework of the green economy itself are presented in the form of 4 classes of individual areas: 1) green retail finance; 2) green investment finance; 3) green asset management; 4) environmental insurance.

We consider the following entities to be subjects of the green financing system: regulatory bodies in the financial and credit sphere, economic development and environmental protection; banks, insurance and leasing companies, funds (national, specialized); financial market participants (financial companies, issue organizers, issuers, recipients and consumers of financial products, financing organizations, borrowers, investors, asset managers, etc.); infrastructure and service organizations (trade organizers, exchanges, rating agencies, certifying, verifiers, etc.); professional analytical, expert and research organizations; project companies, legal and technical consultants.

The globalization of green finance often implies the goal of greening the international financial system. This assumes that appropriate green institutions will be built into each component of the system, and the necessary infrastructure facilities will be created. Green transformation of the financial system is a necessary tool for achieving sustainable development and reducing financial risks associated with climate change and environmental issues *(Murau, S., Haas, A. & Guter-Sandu, A., 2024).* This will require the introduction of new instruments and regulations, as well as changes in risk assessment and management methodologies.

The state plays a leading role in the development and implementation of green policy, and the budget system is the main source of financing for environmental and climate projects. The development of standards, including benchmarks for determining permissible values of CO2 emissions into the atmosphere, the so-called "carbon footprint", is extremely important for classifying certain projects as "green". For several years now, the international community has been discussing the possibility of including projects using so-called "clean coal" (with minimal CO2 emissions) in the "green" category. From the very beginning, the EU took a tough stance on fossil fuels, primarily coal, believing that coal is a "pollutant" by nature and must be immediately and completely excluded from "green" projects.

Climate change has a specific refraction in relation to individual sectors of the financial market. At the same time, climate change contributes to the formation of new green instruments to serve these markets *(Murau, S., Haas, A. & Guter-Sandu, A., 2024)*:

(1) Insurance market. The concept of the “green” insurance institute is based on the Principles for Sustainable Insurance, which were formulated at the initiative of the UN in 2012:

1. *We will embed in our decision-making environmental, social and governance issues relevant to our insurance business.*

2. We will work together with our clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions.

3. We will work together with governments, regulators and other key stakeholders to promote widespread action across society on environmental, social and governance issues (*UNEP Finance Initiative*).

(2) Banking services market (borrowers may experience financial problems due to a reduction in production, sales of services. In addition, the loss due to default on loans secured, for example, by real estate, may increase if the value of the real estate is negatively affected by events related to climate change). A green bank operates like a regular bank while taking into account social and environmental factors of protecting natural resources. Green banking is an increase in the efficiency of internal banking processes, physical infrastructure, information technology and professional activities within the framework of the implementation of banking products in relation to the environment by reducing the negative impact (of these factors) on the environment to a

minimum level. Green banking includes taking into account the following issues: the introduction of environmental responsibility into the daily activities of the bank, such as reasonable use of paper, energy saving, etc.; taking into account sustainable development factors in the development of products and strategy of the bank, such as "green" lending, assessment of projects for environmental friendliness (environmental assessment), i.e. impact on the environment; is aimed at improving operations and technologies, as well as making customer habits in the banking business environmentally friendly.

The phenomenon of preventive banking is being formed – the process of integrating environmental issues and increasing risk management activities into their daily business activities as a result of increased pressure from the government, non-governmental organizations, and pressure from society to accelerate the greening of economic relations. "Green" deposits and "green" savings are of limited interest to both individuals and legal entities, respectively. For an investor, the concept of a "green" deposit and/or "green" savings usually has an exclusively moral meaning. For a bank, the fact of using the funds raised to finance "green" projects is quite difficult to prove due to the specificity of identifying funds. At the same time, the limitations in the practice of "green" deposits are that legal entities, unlike individuals, place temporarily available funds, as a rule, for a short period, which significantly complicates their targeted use for financing green projects *(Murau, S., Haas, A. & Guter-Sandu, A., 2024).*

In the process of investment activities of the insurer as an institutional investor, taking into account compliance with the principles of responsible investment, significant risks associated with environmental factors of sustainable development should be determined when selecting investment objects and their subsequent management. In this regard, there is no talk of "narrowing" investment objects, the emphasis is on reducing risks and, consequently, increasing the return on investment in the long term. Among the environmental factors of sustainable development and associated risks when selecting an investment object, it is recommended to take into account data on greenhouse gas emissions, energy consumption, water consumption, waste generation, information on water consumption management and waste management, etc., for example, ongoing environmental projects.

(3) Collective investment market (the level of financial burden of pension funds will depend on climate migration of the population). Currently, programs in the field of low-carbon financing (carbon finance) for adaptation to climate change are being actively implemented, providing for the following mechanisms: trading in greenhouse gas emission quotas, in which the state or its individual economic entities can sell / buy quotas for greenhouse gas emissions on national, regional or international markets; joint projects to reduce greenhouse gas emissions; clean development mechanisms, which provide for projects to reduce greenhouse gas emissions implemented in the territory of one of the countries (usually developing countries) that have signed the UN Framework Convention on Climate Change *(Konradt, M., Mauro, B. W. di (2021).* Weather derivatives are a financial product that ensures the management of the risks of losses caused by changes in climate conditions.

(4) Foreign exchange market (an outflow of investments from countries with energy-inefficient economies can be expected, which will also lead to a fall in the value of their currency on the international market).

(5) Payment services market (physical climate risks are associated with the possibility of disrupting the integrity of the payment infrastructure and, as a consequence, disrupting the smooth functioning of payment systems, reducing the level of efficiency and availability of money transfer services).

(6) Precious metals market (to complicate or facilitate (due to melting glaciers or drying up of reservoirs) access to deposits, the development of which was previously unprofitable or physically impossible), which will lead to a change in the market price of resources.

It is fair to talk about the emergence of a global market of "green" financial instruments as a new component of the international financial system at the stage of systemic transformation. A feature of this global financial market is its dual connecting quality *(Murau, S., Haas, A. & Guter-*

Sandu, A., 2024):

1) ensuring interpenetration between all components of the international financial system (the global market of "green" financial instruments unites various types of financial instruments); 2) close interaction of the financial and real sectors of the global economy through the implementation of "green" projects and programs. The transformation costs of the transition to the global use of "green" finance are assessed as low, since we are not talking about the creation of fundamentally new financial instruments and institutions in technical terms, but about adding a "green" component to the structure of the issued financial product, through which its new quality is produced. Green bonds occupy an important place in the greening of the financial market. Green bonds are defined as important green financial instruments that are marketable securities that are issued in accordance with established procedures and pay principal and interest as agreed, including but not limited to green financial bonds, green corporate bonds, green corporate bonds, green debt instruments and green asset-backed securities, and are used to raise funds specifically to support green industries, green projects or green economic activities that meet specified conditions. The implications of the greening of the international financial system are complex and the following actual and potential threats and challenges related to the globalization of green finance exist.

1. Financial. The process of greening the international financial system must be balanced. Universal definitions, principles, accounting and reporting standards must be developed and implemented. This will help in solving global financial, economic and "green" problems. At the same time, there is a risk of a new source of global financial instability in the global market of "green" financial instruments, where financial "bubbles" may also arise.

2. Technical. Definitions and identification mechanisms are necessary not only from the financial side, but also from the technical and technological side. For example, difficulties arise in assessing the "green" component in projects in various spheres and sectors of the economy. The International Finance Corporation applied its measurement methodology and found that 100% of the "green" component is contained in "clean" energy projects; 0% - in oil and gas, petrochemical and coal; 17% - in construction; 13% - related to food, agriculture, timber processing and forestry; 10% in infrastructure and transport projects and 0.1% in automobile projects *(Green Finance: A Bottom-up Approach to Track Existing Flows, 2016)*.

3. Institutional. New institutions have a number of significant drawbacks, such as high management costs, a gap between liquidity and the underlying asset, and a tendency to operate with a high level of leverage. All of the above features of the analyzed structures increase the risks of their functioning. Thus, the need for control, regulation, and regulatory support for the activities of these investors increases.

4. Psychological. Since "green" projects require large investments and the sphere of "green" finance is relatively new to the international financial system, various entities of financial and economic activity may be quite cautious about working with the relevant financial instruments. Consequently, it is necessary to stimulate the green activity of economic agents.

Conclusions and prospects for further research. Improving the concept of sustainable development necessitates placing new emphasis on well-known and well-studied phenomena, focusing researchers' attention on issues of financing environmental protection, ecology, combating climate change and transition to an energy-efficient economy from the point of view of the ESG approach.

In international practice, the following sources of motivation for the implementation of ESG strategies of green finance have been recorded: allocation of a new segment of the financial market for quoting shares of ESG ranking businesses (USA); shortage of long-term capital for financing infrastructure and environmental projects (USA, EU); attracting attention to environmental issues by civil society (EU); tightening environmental standards of international trade (UK, EU); the need to comply with international norms and conventions, the pressure of sanctions

A significant element of the functioning of the global climate agenda system, which

influences the global financial system and allows reducing greenhouse gas emissions, is the carbon market and the Emissions Trading System (ETS), which plays the role of a market mechanism based on the cap-and-trade principle. The mechanism consists of the establishment by governments of an upper limit on the total volume of emissions, usually for a certain industry, and the introduction of an obligation for companies in this industry to obtain a permit for each unit of their emissions with the possibility of purchasing units on the open market. The main reference point here is the cost of a carbon unit (tons of CO2 equivalent). The state has both a direct impact (through financing measures to transition to a low-carbon and energy-efficient economy) and an indirect impact, stimulating economic entities to environmentally and climate-responsible behavior.

We propose to consider green finance as a whole complex of economic relations related to the financing of environmental protection measures, combating climate change, transition to a low-carbon and energy-efficient economy, effective management of environmental and climate risks, and implementation of financial control in many areas of public relations. Financial institutions are the most important drivers of climate projects. An energy-efficient economy will ultimately be implemented only to the extent that it is financially beneficial and profitable. Consequently, the financial market and climate influence each other on the basis of direct and feedback links. Projects in the field of sustainable and responsible climate development are in themselves a source of profit for financial market participants. Thus, the demand for support of green projects has led to the emergence of new types of financial services and financial instruments, the issue and circulation of which contributes not only to the financial support of relevant projects, but also to the development of the financial market. Traditional criteria for selecting sources of financing are: compliance of demand and supply of financial resources for a specific project, compliance of supply with the time frame of the project, cost of attraction, systematic and non-systematic risks, efficiency of reproduction of own funds, assessment of compliance of sources of financing with the structure of investments in the project, etc. As separate criteria for choosing between traditional and "green" financing, it is necessary to indicate institutional and infrastructural provision, availability of state support in the form of state programs, projects, incentive instruments, the degree of development of the financial and credit market.

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