

# Innovative Green Finance Tools



Olga B. Ivanova , Natalia G. Vovchenko , Olga V. Andreeva ,  
Oksana S. Chernobay , and Elena D. Kostoglodova 

**Abstract** The research is based on the theoretical approaches of the concept of green economy, suggesting the need to justify the use of new financial instruments. The research discusses the tools of green financing—emissions trading, environmental insurance, and carbon tax, which contribute to the development of effective provisions for increasing the sustainability of the environment. The authors used data from open sources published on official Russian and foreign websites. The authors analyzed the available scientific publications on the subject of green finance. The experience of various countries (China, Great Britain, New Zealand, Russia, etc.) on the implementation of the introduction of green financial instruments has been studied. The authors formulated a number of conditions that will contribute to the more active development of innovative green financial instruments.

**Keywords** Green economy · Green financial instruments · Pollution quotas · Carbon tax · Environmental insurance · Sustainable development

**JEL Classification** G21 · G28

## 1 Introduction

The study of directions for the development of green finance to ensure the sustainable development of the economy today is an urgent and priority task.

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O. B. Ivanova · N. G. Vovchenko · O. V. Andreeva · O. S. Chernobay (✉) · E. D. Kostoglodova  
Rostov State University of Economics, Rostov-On-Don, Russia  
e-mail: [Oksana.chernobay1982@yandex.ru](mailto:Oksana.chernobay1982@yandex.ru)

O. B. Ivanova  
e-mail: [sovets-1@rsue.ru](mailto:sovets-1@rsue.ru)

O. V. Andreeva  
e-mail: [olvandr@ya.ru](mailto:olvandr@ya.ru)

Green financial instruments are aimed primarily at the rational use of natural resources and maintaining an optimal state of the environment. They are also called upon to act as one of the necessary and important conditions for the sustainable development of society.

The development of the industrial complex, the increase in the number of vehicles, and the growth of energy consumption, waste, and air pollution have an extremely negative impact on the state of the environment and are global environmental problems. Some regions (especially those with intensive industrial production) face excessive aridization, desertification, biodiversity reduction, etc. Additionally, there is an extremely negative impact on the nutritional status and health of the population. As a result of the negative impact, there was an imbalance in the environment, in the “human-nature” system, which already requires appropriate costly measures to restore it [1].

The search for additional financial resources is still relevant to compensate for the damage caused by economic activity and ensure environmental safety.

Recently exposed to numerous challenges, economic and financial stability required rethinking, overcoming, and continuous monitoring of situations.

New opportunities and new innovative prospects have opened up due to the need to develop clean technologies. This new wave of innovation will inevitably lead to the merger and unification of the natural environment and business. Green finance can become a significant factor that will determine further development and ensure the progress of society.

Innovative green finance can transform information and financial flows into material innovations and rebuild the “human-nature” system to be optimal for preserving and improving the quality of people’s lives.

Numerous programs and various environmental initiatives are developed at the level of governments in many countries. These measures are aimed at reducing the level of emissions of harmful substances into the atmosphere and hydrosphere, climate change, waste disposal, conservation of the number of plant and animal species, etc. These problems are also relevant to Russia.

This paper considers innovative green finance tools that contribute to developing effective environmental sustainability.

These questions are being developed by Russian and foreign scientists (T. A. Zambrovskaya, N. N. Semenova, O. L. Konyukova, B. S. Goryachkin, A. A. Tatuev, A. S. Fedoryashchenko, R. Mastini, B. Sutherland, and others).

Zambrovskaya et al. [2] identifies the problems of verification of green financial instruments. Semenova and Grebentsova [3] consider the use of green financial instruments in the interests of sustainable development. Konyukova and Korchebny [4] describe features of the development of environmental insurance in Russia. Goryachkin and Stryukov [5] prove that carbon quotas are an effective economic solution for resolving the carbon problem.

Mastini et al. [6] analyze the Green Deal and the possibility of its growth. Sutherland [7] studies the financing of the new Green Deal.

## 2 Materials and Methods

The research methods include general scientific (analysis, synthesis, generalization, and comparison) and special (expert assessments and statistical data analysis). The research is based on the theoretical approaches of the concepts of sustainable development and the green economy, suggesting the need to justify the use of new financial instruments, such as trading in greenhouse gas emissions, carbon taxes, environmental insurance, etc. The authors used data from open sources published on official Russian and foreign websites. Additionally, the authors analyzed the available scientific works on the subject of green finance. Moreover, the authors studied the experience of various countries (the UK, China, Russia, etc.) in developing green financial instruments.

## 3 Results

An innovative source of financing, which is actively used in many countries to solve environmental problems, is the trading of quotas for greenhouse gas emissions.

The Paris climate agreement was adopted on December 12, 2015. Its goal is to prevent the average annual temperature on a planetary scale from exceeding by more than 2 °C by 2100 from pre-industrial levels, as well as to take measures to keep warming within 1.5 °C.

The participants of this agreement assumed one of the obligations, which is to reduce CO<sub>2</sub> emissions into the atmosphere systemically. To realize this commitment by 2020, it was necessary to develop national strategies for the transition to a carbon-free economy [8].

Nowadays, there are 24 emissions trading systems in the world. At the beginning of 2016, there were only 17 such systems in the world, covering 35 countries [9].

A cost-effective policy tool that governments and companies can use as part of their broader climate strategy is carbon pricing. This creates a financial incentive to reduce emissions through price signals. By factoring the costs of climate change into economic decision-making, carbon pricing can drive changes in production and consumption patterns, thereby supporting low-carbon growth.

In developed countries, evidence suggests that carbon pricing promotes productivity and innovation and has no detrimental effect on economic development [10].

Planning measures to regulate emissions trading began in the early 2000s. Nevertheless, the development of many legal and technical issues took quite a long time. The first full-fledged system of trading in quotas appeared only in 2005 in the European Union.

Switzerland and New Zealand joined in 2008. In South Korea, cap-and-trade (or quotas) was launched in 2015. In China, the first pilot CO<sub>2</sub> trading systems started operating in 2013; the full system should be launched before 2025 [11].

**Table 1** Advantages and disadvantages of the CO<sub>2</sub> emissions trading mechanism

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Maintaining a balance between production and environmental protection, equalizing the volume of harmful emissions from different companies or countries</li> </ul>	<ul style="list-style-type: none"> <li>• Many countries are not interested in reducing emissions, citing the fact that emissions are already low compared to neighboring countries</li> </ul>
<ul style="list-style-type: none"> <li>• Stimulating business, which makes it possible to make production less harmful</li> </ul>	<ul style="list-style-type: none"> <li>• The effect of “leakage of carbon”—the effect of emissions flowing to countries with less stringent environmental policies</li> </ul>
<ul style="list-style-type: none"> <li>• Voluntary responsibility of business for the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Formation of a market for clean air and the size of available quotas</li> </ul>
<ul style="list-style-type: none"> <li>• Predictability. The company builds a plan, taking the number of quotas into account. This makes it possible to plan the expenses in advance</li> </ul>	<ul style="list-style-type: none"> <li>• The high cost of innovation. It is easier to buy quotas than to modernize production</li> </ul>

Source Compiled by the authors

“Quotas” is the allowable volume of emissions of pollutants into the atmosphere.

The operation scheme of the emissions trading mechanism is as follows. Special bodies or the government sets the standard for greenhouse emissions per year from all types of pollution sources. Polluting companies are assigned a quota based on the established norm. In this case, the quota is the volume of emissions that pollutants can release into the atmosphere. Next, the quota is sold to specific pollutants—the subjects of pollution (fuel and energy companies, the chemical industry, mechanical engineering, and others).

Pollutants are required to have an emission permit in the amount that will be determined based on the actual level. The number of quotas should not exceed the level of CO<sub>2</sub> emissions that corresponds to the enterprise’s production program [12].

This mechanism has advantages and disadvantages (Table 1).

Currently, CO<sub>2</sub> emissions trading operates in 24 national and subnational markets. There are 20 more such marketplaces under development. Since 2021, three new markets with considerable money turnover have already been launched—in China, the UK, and New Zealand.

China has launched its national CO<sub>2</sub> trading system, which will regulate more than 2000 power plants with combined emissions of 4.3 billion tons.

This does not rule out an increase in the growth of prices for quotas. This is likely to happen as soon as the government of China sets an upper limit on emissions and systemically lowers it annually.

Between 2021 and 2025, the New Zealand government has set a cap on total emissions from sectors covered by the New Zealand ETS of 40 Mtpa.

New exchange and marketplace for carbon credits were planned to be launched in Singapore by the end of 2021, supported by banks DBS (DBSM.SI), Standard Chartered (STAN.L), Singapore Exchange (SGXL.SI), and state investor Temasek Holdings. There are more and more such sites in Asia [13].

From May 2021, the UK cap-and-trade system began issuing free emissions permits for the UK's traditionally largest emitters in the steel and cement industries.

The UK Emissions Market has shifted the CO<sub>2</sub> emission charges levied by the EU on UK businesses to England.

Trading in quotas for CO<sub>2</sub> emissions is also an important factor that affects the export and import of oil and gas to different countries of the world. In some countries, exchanges for trading in such goods have been operating for more than ten years; in some, they are being launched only now.

Trading occurs not only in the so-called carbon units but also in credits for them when one company resells unused quotas (because it has not exceeded the allowable emission standard) to another. Moreover, in some countries, futures for CO<sub>2</sub> emission allowances are already being traded [13].

Another financial innovation is greenhouse gas taxes (carbon taxes).

In early 2021, the European Parliament approved the carbon tax law, which is a de facto duty on imported goods into the EU. It also allows issuing CO<sub>2</sub> emission allowances free of charge to European companies. The European Commission should implement a bill by 2023.

Similar to the EU Emissions Trading Scheme (EU ETS), carbon taxes use the price of carbon but with a different pricing mechanism.

On carbon exchanges, prices are set by the market based on physical limits set by the authorized state body on greenhouse gas emissions. These limits are gradually reduced, stimulating an accelerated transition to more energy-efficient and environmentally friendly technologies and industries.

A carbon tax aims to force individuals and firms to pay the full social cost of carbon pollution. Theoretically, the tax would reduce pollution and encourage cleaner alternatives. However, some critics argue that a carbon tax will increase business costs, reduce investment, and slow economic growth.

According to the experience of several countries, introducing a carbon tax seems to be the most promising mechanism for influencing producers to green production.

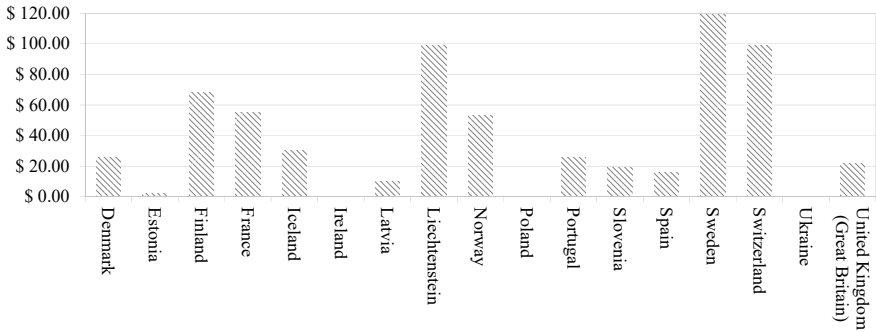
There are several arguments in favor of a new innovative financial instrument.

First, the carbon tax will significantly affect the environment. With higher taxes, businesses, firms, and organizations will reduce pollution and look for alternatives with minimal environmental impact. Alternative sources of electricity can serve as an example. This may make it more feasible to produce electricity from environmentally friendly sources (e.g., solar energy). If we develop environmentally friendly sources, it will make us less dependent on oil. Solar energy can become even more competitive than traditional fossil fuels.

Second, it will help ease the transition to a post-oil economy.

The high price of carbon emissions will encourage businesses and organizations to develop and implement cleaner technologies, more efficient engines, carbon consumption alternatives, etc.

It is possible that this may be a call for society to become more responsible consumers. More people may be interested in switching from cars to bicycles and walking more. This would have a health benefit, such as a reduced risk of a heart attack.



**Fig. 1** Carbon tax rates (US dollar) in Europe. *Source* Developed by the authors based on [17]

Third, there are opportunities to increase carbon tax revenues, which can then be used to subsidize alternatives (e.g., clean electricity) or to repair damage caused by pollution.

This will certainly lead to a socially significant result, making people pay the social costs and overcome the excess consumption that we more often see nowadays [14].

Compensation for the costs of environmental protection measures, as well as compensation for damages from losses, can be made at the expense of funds accumulated through such a financial instrument [15].

Many European countries, as well as Mexico and Japan, use carbon taxes. As of April 2015, the annual global carbon tax collection was estimated at \$14 billion [16].

In a number of countries, the carbon tax is set differentially depending on the industry affiliation of the manufacturer and the fuel used.

The amount of carbon tax established in European countries (as of April 1, 2020) is shown in Fig. 1.

In 2021, the largest carbon tax was set in Sweden and amounted to \$137 per ton of CO<sub>2</sub>, followed by Switzerland and Liechtenstein (\$101 USD/t of CO<sub>2</sub>) [18].

All countries of the European Union (as well as Iceland, Liechtenstein, and Norway) are part of the EU Emissions Trading Scheme (EU ETS), a market set up to trade a limited amount of greenhouse gas credits. Except for Switzerland, Ukraine, and the UK, all European countries that impose a carbon tax are also part of the EU ETS. Switzerland has its own emissions trading system, which has been linked to the EU ETS since January 2020. After Brexit, the UK introduced its own British ETS from January 2021 [17].

Russia is discussing its own version of the carbon tax. Simultaneously, major Russian manufacturers are pursuing green modernization, introducing the latest energy-efficient and resource-saving technologies (including the abandonment of fossil fuels and the transition to hydrogen) and installing advanced systems for capturing emissions into the atmosphere and water flows. However, not all companies are ready to invest in new capacities.

Another promising financial instrument that can fully or partially compensate for the damage caused to the environment in case of accidental pollution is environmental insurance [19].

Environmental insurance is one of the methods of economic regulation in the field of environmental protection [20].

A prerequisite for the emergence of such insurance relations is environmental risk. Environmental risks have their own classification and are characterized by the following types: individual, technical, ecological, social, and economic.

Discussing the expected environmental damage and economic losses is a serious job of assessing environmental risks.

According to the Federal law “On environmental protection,” environmental risks are understood as “the probability of the occurrence of an event that has adverse consequences for the natural environment and is caused by the negative impact of economic and other activities, natural and human-made emergencies” [21].

Environmental insurance is a tool for ensuring the financial sustainability of various types of environmental activities. It is one of the methods for managing environmental risks in nature management.

Environmental insurance has two forms: voluntary and mandatory.

Environmental insurance, which is carried out at the expense of budgetary funds and is carried out by virtue of Federal law No. 225-FZ, is compulsory. Special normative acts determine the types, conditions, and procedures for its implementation. An example is the current Federal law “On compulsory insurance of civil liability of the owner of a hazardous facility for causing harm as a result of an accident at a hazardous facility” (July 27, 2010 No. 225-FZ) [22].

Potentially dangerous objects are subject to compulsory insurance. If the owner of such an object does not fulfill his or her insurance obligations, the operation of the enterprise is not allowed.

Voluntary environmental insurance is comparable to voluntary certification of products. It increases the enterprise’s prestige and is an excellent competitive advantage for the company.

The reasons for the insured event, the list of pollutants, as well as compensation for damage under voluntary environmental insurance between the insurer and the insured are negotiated upon the conclusion of the insurance contract in each case individually. The insured pays insurance premiums at tariff rates depending on the enterprise’s annual turnover.

Environmental insurance is important for Russia as a mechanism for managing environmental risks. Russia has many facilities that carry a potentially serious environmental hazard.

Insurance funds are the financial basis for environmental insurance [23].

The sources of the formation of the total insurance fund in the Russian Federation are still primarily the federal and regional budgets, then the reserves of commercial insurance companies and personal savings of citizens. In Russia, environmental insurance began to form back in the 1990s; this process continues to this day.

## 4 Conclusion

The authors of this research identified several conditions that will contribute to the more active development of innovative green financial instruments.

Thus, the main instruments for stimulating the reduction of carbon emissions are emissions trading systems, carbon tax, and environmental insurance.

The analysis of the creation and stages of development of emissions trading in the EU showed that this mechanism still faces numerous difficulties. Accordingly, this requires finding ways to overcome them and opens up a wide range of possibilities for future research.

Many conditions are required for the successful implementation of emission quotas.

First, it is necessary to continue the development and gradually introduce pilot projects and innovative regional programs to control and reduce CO<sub>2</sub> emissions. Programs must be flexible enough to respond to the many changes occurring in the country's economy. One example is the National Project "Ecology," in particular the Federal project "Clean Air," aimed at reducing the level of air pollution. Within the framework of the project, work related to air was planned, such as creating an effective system for monitoring and controlling the quality of atmospheric air. Similar projects are needed in all regions of Russia, especially those with intensive industrial production.

In our opinion, under the current conditions of uncertainty, the emissions regulation system in Russia (CO<sub>2</sub> emissions quotas) requires the following:

- Well-established methodology,
- Detailed relevant regulatory legal acts,
- Creating carbon disclosure standards,
- Formation at the national level of independent bodies to control carbon emissions,
- Improvement of the monitoring and verification system for emissions.

The emission regulation system should be as simple and transparent as possible for the economic and technological greening of the country. We also believe that polluters should decide for themselves how they will reduce their CO<sub>2</sub> emissions.

High carbon taxes can cause tax evasion by polluting firms, reducing investment, and slowing down economic growth.

It is possible that firms can move their production to countries where there is no carbon tax. In the current situation, Russia is of great interest to the experience of those countries where the mechanism is already operating and producing positive results.

The carbon tax should become integral to the country's large-scale low-carbon development strategy. First, for a carbon tax to be introduced, it must be built in as a means of incentivizing cleaner energy production, while the system of taxation of the energy complex will need to be transformed. Second, it is necessary to introduce mechanisms for measuring the "carbon footprint" and work out opportunities to reduce carbon emissions through the modernization of production.



Second, there is no full-fledged normative document on environmental insurance in Russian legislation that would regulate public relations in this area.

The development of environmental insurance in the Russian Federation will reduce the burden on the federal and regional budgets. By making environmental insurance affordable, providing a choice of insurance programs and policies, and ensuring lower insurance premiums, businesses can be encouraged to take on voluntary insurance.

The accumulated funds received as a result of compulsory and voluntary environmental insurance will subsequently be directed to the modernization of production and preventive environmental measures.

We consider the reviewed green financial instruments and mechanisms for influencing climate problems to be extremely promising for Russia. Nevertheless, they require additional detailed study.

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