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Mechanisms for Tax Regulation of CO_2-Equivalent Emissions

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Abstract: The aim of the work is to develop a mechanism for cross-border carbon regulation for countries importing products to the EU, which will equally allow importing countries to fulfill the conditions of the Carbon Border Adjustment Mechanism (CBAM), encourage manufacturers to reduce CO_2 emissions, and also provide importing countries with opportunities to replenish their budget by introducing paid emission quotas greenhouse gases. The work makes a significant contribution to stimulating the reduction of CO_2 emissions by producers due to the proposed tax mechanism and preventing the leakage of greenhouse gases on the territory of third countries according to the CBAM policy. The EU evaluates double taxation, so if a carbon tax has been withdrawn in the territory of the exporting country, then such a tax will not be levied again in the EU. All this involves stimulating exporting countries by creating their own taxation systems, which will have international qualifications and be recognized by countries around the world. When choosing a taxation mechanism, it is important to choose the specifics for visiting group gases. The study was conducted on the basis of methods of comparison, modeling, analysis and deduction.

Keywords: green economy; greenhouse gases; cross-border carbon regulation; investments; taxes

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1. Introduction

All over the world, environmentalists are sounding the alarm about the increase in atmospheric temperature, which entails the melting of glaciers and the possible cataclysms associated with this [1–8]. The main cause of warming is the endless emissions of greenhouse gases due to the development of production and increased consumption.

The European Union is planning to introduce transboundary carbon regulation, which aims to curb carbon emissions by imposing additional duties on emissions and phasing out carbon quotas. As a result, companies will be forced to modernize production and reduce emissions, and the states of the European Union will receive additional budget revenues. This carbon tax is planned to be levied not only from enterprises whose production is located in the EU, but it will also apply to all imported goods on the territory of the EU member states. However, in order to avoid double taxation, EU Member States will not re-levy the tax on imported goods if they were previously subject to carbon tax in other countries [9–15]. In this regard, the Russian authorities are also developing and implementing a system for accounting for greenhouse gas emissions, as well as developing a system for taxing such emissions. In this paper, we will consider the prospects for introducing a carbon tax in Russia, and also evaluate possible additional revenues from such a tax.

The contribution of the work is to propose a working mechanism for cross-border carbon regulation for importing countries, which is aimed at encouraging manufacturers to

reduce their CO_2 emissions. The mechanism includes the variability of taxation depending on the types of greenhouse gases emitted. The paper also provides a possible budgetary effect from the introduction of the proposed mechanism and shows the impact of the tax on the financial performance of manufacturing companies. The proposed incentive measures in the form of an additional tax should have a positive impact on third countries to introduce a mechanism for cross-border carbon regulation.

2. The Concept of Reducing CO_2 Emissions in the Literature and in Regulations

The trend is such that almost all major players in the industry market consider themselves adherents of the ESG (Environmental, Social and Corporate Governance) principles [16–18]. Russian companies are no exception. The paper presents data from the annual reports of several major Russian industrial companies that seek to reduce their CO_2 emissions. Thus, Rosneft, in its annual report [19], states that the reduction of greenhouse gas emissions is part of its 2022 strategy as part of the Company's commitment to the UN Sustainable Development Goals and contribution to the implementation of the priority goal "Combating Climate Change". In June 2019, Rosneft joined the initiative of leading international oil and gas companies and signed the Guidelines for Reducing Methane Emissions in the Natural Gas Supply Chain [20].

Gazprom claims in its annual report [21] that reducing CO_2 emissions is part of its corporate strategy. Measures are being taken to minimize the negative impact of climate change on production activities. Energy efficiency and energy saving programs, effective technological processes for various climatic conditions are being developed and implemented; Programs are being implemented to improve the efficiency of the system of production, transportation and operation of the gas transmission network, a program to adapt the production activities of PJSC Gazprom to changing climatic and geocryological conditions. In 2021, Gazprom Group companies were recognized as the best Russian oil and gas companies in the CDP rating. According to the totality of the disclosed indicators, they were assigned a climate rating of "B", while in four categories out of 11 ("Emissions coverage 1 and 2", "Management", "Initiatives to reduce emissions" and "Disclosure of opportunities"), PJSC Gazprom received the maximum rating of "A". Experts of the CDP partnership once again recognized that Gazprom is taking all possible and coordinated actions to protect the climate, disclose complete and reliable information on climate issues, conduct full-scale work on planning and resolving issues on climate change.

Severstal also adheres to the principles of reducing the carbon footprint. Chairman of the Board of Directors of the company A. Mordashov in his address to shareholders [22] says that "based on the goals announced in 2020, in 2021 we set a new task for the medium term—to reduce specific carbon dioxide emissions per ton of steel by 10% by 2030". This is one example of Severstal's commitment to reducing its environmental impact and contributing to global efforts to achieve the goals of the Paris Agreement. In the reporting year, Severstal received the award of the World Steel Manufacturers Association as a leader in the field of sustainable development among the largest steel producers in the world. Severstal became the first Russian company to join the ResponsibleSteel global standardization and certification initiative aimed at ensuring the maximum contribution of steel producers to the implementation of sustainable development goals. Climate change entails not only risks, but also new opportunities, such as an increase in demand for eco-friendly products". Severstal's annual report [23] also states that in order to increase interest in solving the tasks of the Company's climate agenda, targets for reducing greenhouse gas emissions were included in the KPIs of the 11 top managers. All targets for reducing greenhouse gas emissions for 2021 are set at 5%. In addition, KPIs on carbon intensity and energy efficiency were established for Severstal CEO, Director of Occupational Safety and Industrial Safety and Chief Power Engineer. There are also mechanisms for encouraging other employees of the Company who are directly involved in projects aimed at solving the tasks of the climate agenda and reducing greenhouse gas emissions [24].

According to the company, Norilsk Nickel [25] focuses on the production of low-carbon products. The company occupies a strong starting position in the market in terms of absolute and specific greenhouse gas emissions, maintaining one of the lowest indicators in terms of absolute and specific greenhouse gas emissions among comparable international companies in the mining and metallurgical sector. In 2021, Norilsk Nickel, for the first time, assessed the specific carbon footprint of all manufactured products by developing a calculation methodology in accordance with international standards for the product life cycle assessment (LCA ISO 14040/14044). The methodology was certified by the international company in the field of product life trace assessment (LCA) Sphera Solutions GmbH—a recognized expert in this matter in the mining and metallurgical sector, the results of quantitative calculation of the carbon footprint of the Company's products for 2020 were certified by the auditor EY. The carbon footprint of refined nickel produced by the Company amounted to 8.1 tons of CO_2-eq. per ton, which is significantly lower than the industry average [25].

Rusal, another major Russian metallurgical company indicates in its report [26] that disclosure of information in accordance with the TCFD recommendations is part of the climate change management mechanism. To assess the effectiveness of the management approach in this area, the Company conducts internal and external audits and verification, uses data assessment and monitoring systems, participates in external ratings, benchmarking competitors' indicators and collects feedback from customers by conducting surveys. In 2021, Rusal participated in more than 10 large-scale surveys in the field of ESG factors, responded to more than 200 requests sent by customers related to the carbon footprint. The methodology for calculating greenhouse gas emissions in the metallurgical segment is certified by the independent organization TÜV Austria as part of the audit and verification of greenhouse gas emissions data.

Thus, all of the above indicates the strict commitment of the main manufacturing giants of Russia to reduce CO_2 emissions, which means that they are potentially ready to introduce mandatory tax regulation of emissions by the state and the importers of their products.

The statistics on the global dynamics of emissions are well reflected in the BP company report [27], which shows the dynamics of emissions of the main regions, as well as the countries included in these regions. Unfortunately, we cannot observe a clear positive trend in reducing CO_2 emissions, which is largely due to an increase in global production. For example, China has shown a significant increase in its carbon footprint since 2016. There are no prerequisites for reducing such a trace at the moment.

The Ecosystem Marketplace website [28], as well as the World Bank website [29], provides statistics on the volume of voluntary trade in carbon units; as well as prices to the countries issuing carbon units. Based on the statistics provided, we can observe a significant increase in the voluntary market for trading carbon units. Additionally, the Ecosystem Marketplace website presents various international mechanisms for accounting for greenhouse gas emissions that have received international recognition. Among the listed mechanisms, the leader is Verified Carbon Standard, which covers about 69% of all existing carbon units.

In many works [30–37], the field of the green economy as the basic policy of further development of states is investigated. The impact of the green economy on society, as well as on the agrarian and industrial system of states is investigated. The instruments of financing the green economy, which for the most part are "green" bonds, are considered.

The UNFCCC Sites and platforms [38] and United Nations Web Page [39] information portals present declarations, conventions and other regulatory documents that relate to the topic of our research. First of all, we will be interested in the Paris Agreement on Climate Change and the Kyoto Protocol, since they are the basic documents regulating activities to reduce CO_2 emissions.

In our research, we will use the main document regulating taxation in the Russian Federation—the Tax Code of the Russian Federation [40]. Based on the existing developed

taxation mechanisms, we will create a new mechanism capable of regulating taxation in the field of CO_2 emissions.

Alternative using of CO_2, its storage, chemical reactions using CO_2 are described by researchers in investigations [41–48].

3. Data and Methods

To determine the mechanism of cross-border carbon regulation, data were taken from the published annual reports of the main Russian companies in the oil and gas industry and metallurgy, since these industries are defined in the CBAM concept approved in the EU. Based on the companies' reports, data on actual greenhouse gas emissions by year were selected. We need the amount of greenhouse gas emissions to determine the tax base of companies. Additionally, to assess the impact of the introduction of a carbon tax on companies in the oil and gas and metallurgical industries, the main financial indicators from the published financial statements of the studied companies by year were used. The initial data were processed on the basis of methods of comparison, modeling, analysis and deduction.

Consider the carbon emissions of some backbone enterprises for 2018, 2019, 2020. Consider emissions in Scope 1, direct emissions, and Scope 2, indirect emissions (Table 1 and Figure 1).

Table 1. Emissions in Scope 1, direct emissions, and Scope 2, indirect emissions, mln t.

Company	2018	2019	2020
Rosneft	76.9	81.2	81
Severstal	27.77	28.11	27.86
Nornickel	9.94	9.95	9.70
Rusal	28.59	28.11	25.86
Gazprom	128.3	123.17	105.74

The overall dynamics of carbon emissions in the chart below.

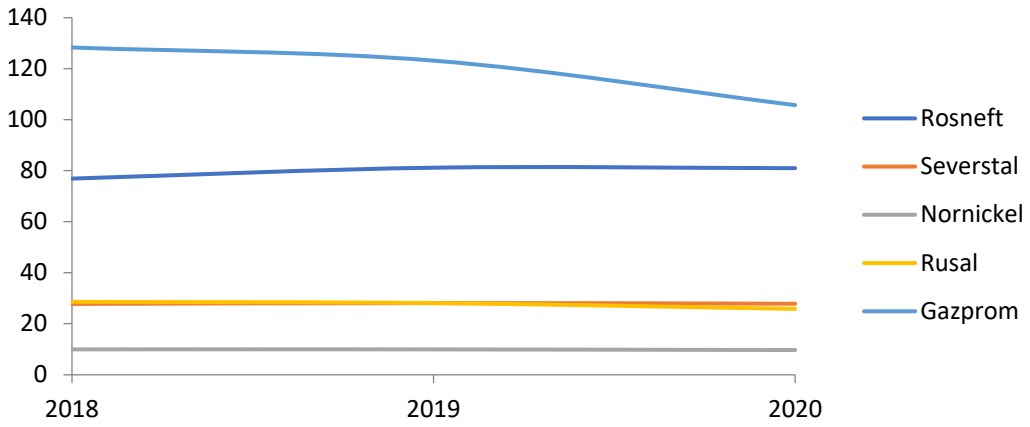

Figure 1. The graph of CO_2 emissions shows that the dynamics of the main companies is stable, with the exception of Gazprom, which shows the dynamics of reducing CO_2 emissions from 2019 to 2020. The data are given in million tons. The data are taken from the sustainability reports of companies for 2021.

From the dynamics above, it is obvious that oil and gas companies (Gazprom, Rosneft) have significantly higher emissions compared to metallurgical companies. In addition, for the period 2018–2020, we do not see positive dynamics in reducing greenhouse gas emissions, with the exception of Gazprom. However, it should be taken into account here

that this company has the largest amount of emissions among those considered, therefore, apparently, it has the potential for reduction.

To assess the possible impact on government revenues, as well as to determine the level of cost of carbon units, we will conduct some research on some backbone enterprises of the Russian Federation. At the moment, the Russian Federation is considering the following rate for a carbon unit equivalent to 1 ton of greenhouse gas emissions: 2000 rubles per unit. This rate is uniform and does not have diversification depending on the type of activity of the enterprise. Thus, having data on emissions and the cost of a carbon unit, we will evaluate possible budget revenues in retrospect for 2018–2020 (Table 2).

Table 2. Cost of emissions, billion rubles.

Company	2018	2019	2020
Rosneft	153.8	162.4	162.0
Severstal	55.5	56.2	55.7
Nornickel	19.9	19.9	19.4
Rusal	57.2	56.2	51.7
Gazprom	256.6	246.3	211.5

In total, for five companies, additional budget revenue from carbon dioxide emissions will amount to about 500 billion rubles in 2020. Obviously, such a size of payments by companies will create significant budget revenues, but there are significant risks for both the companies themselves and for buyers of products, since it is obvious that manufacturers will pass on additional costs to buyers, which will lead to price increases and inflation may increase.

The financial performance of selected companies for 2020 and evaluate their ability to pay a carbon tax are shown below (Table 3).

Table 3. Financial indicators, billion rubles.

Financial Indicators	Rosneft	Severstal	Nornickel	Rusal	Gazprom
Revenue	5757	494.8	1117	633	6322
Cost price	5379	283.7	324	525	5666
EBITDA	1209	175.6	552	64	1467
EBITDA margin	21.0%	35.3%	49.5%	10.2%	23.2%

It is clear from the analysis that the companies have different levels of EBITDA margin. The highest level of profitability is shown by Norilsk Nickel and Severstal, the lowest among the studied companies is Rusal.

Evaluation of the impact of an additional carbon tax on the EBITDA margin of companies with unchanged prices for manufactured products is shown below (Table 4).

Table 4. Financial indicators, billion rubles.

Financial Indicators	Rosneft	Severstal	Nornickel	Rusal	Gazprom
Revenue	5757	494.8	1117	633	6322
EBITDA	1047	119.88	533	13	1255
EBITDA margin	18.2%	24.2%	47.7%	2.0%	19.9%
Reduction of EBITDA	2.8%	11.1%	1.7%	8.2%	3.3%

Based on the table above, we see that Rusal without state emission quotas or without increasing the cost of products has a minimum return on sales of 2%, which is significantly lower than the market. The carbon tax has the greatest impact on EBITDA on steel companies Severstal and Rusal. Companies in the oil and gas industry (Rosneft, Gazprom) are minimally affected by the carbon tax.

Based on the observation made, the impact of an additional tax on greenhouse gas emissions can be optimized for the carbon tax rate to encourage oil and gas companies to reduce emissions. A 7–8% reduction in companies' margins will have a significant impact on companies (Tables 5 and 6).

Table 5. Financial indicators, billion rubles.

Financial Indicators	Rosneft	Gazprom
Revenue	5757	6322
EBITDA	804	938
EBITDA margin	14.0%	14.8%
Reduction of EBITDA	7.0%	8.4%

Table 6. Additional state income, billion rubles.

Financial Indicators	2018	2019	2020
Rosneft	384.5	406	405
Gazprom	641.5	615.85	528.7
Total	1026	1021.85	933.7
Additional state income	615.6	613.11	560.22

Thus, the table above shows that potentially with an increase in the carbon unit rate from 2000 thousand rubles to 5000 rubles for oil and gas producing companies, the additional state income only at the expense of Rosneft and Gazprom can amount to 560 billion rubles in 2020.

Taking into account the tax rates and the additional income of the state, the most important factor is the sources of formation of the company's revenue, namely the price for the domestic consumer. If the state does not develop an effective system for regulating and monitoring domestic prices, then the introduction of an additional tax may be a blow to the well-being of citizens.

4. Results

Consider the process of verification and trading in the international market for carbon credits.

According to the national accreditation system, as of 22 December 2021, Rosaccreditation receives applications from organizations for accreditation as greenhouse gas verification bodies. When accrediting organizations, it is important to understand that accredited organizations must be recognized abroad and have a transparent international system of assessment and verification.

Accreditation is voluntary, therefore Rosakkreditatsiya cannot predict the number of applicants, however, by now they declare about ten companies. Currently, Rosaccreditation together with the National Accreditation Institute have trained independent accreditation experts.

The introduction of a new area of accreditation plays a crucial role in the recognition of Russian carbon reporting in foreign countries. Since only in this case, manufacturers will be able to avoid double taxation. At the beginning of 2022, Roascreditation plans to apply for mutual recognition of reporting under the International Accreditation Forum (IAF) system. Thus, in case of successful recognition of accredited Russian organizations for the validation and verification of greenhouse gas emissions, they will be able to use the international IAF mark, which will allow them to receive recognition of the activities of such organizations abroad.

Within the framework of the 26th UN Climate Conference, the system of international trading in carbon units was approved. According to the approved rules, participating countries can buy carbon units from countries that have reduced their greenhouse gas

emissions below their obligations, i.e., countries with unused carbon credits. Currently, there are international mechanisms for accounting for greenhouse gases, which have international recognition. These are mechanisms such as:

- Verified Carbon Standard;
- Gold Standart;
- Clean Development Mechanism;
- American Carbon Registry;
- Climate Action Reserve;
- Plan Vivo.

Among these mechanisms, the leader is the Verified Carbon Standard, which covers about 69% of all existing carbon units.

European transboundary carbon regulation is another step towards reducing greenhouse gas emissions and improving natural conditions. However, even in such a mechanism, one can count on additional state revenues. On the one hand, this is a challenge for companies, and on the other hand, it is an opportunity for further economic growth, since the sustainable development policy is currently highly valued by investors. Additionally, the policy of the "green" economy generates new financial instruments that allow you to attract borrowed capital. With balanced state regulation, Russian producers will be able to pay tax not in favor of the European Union, but in favor of the budgets of the budget system of the Russian Federation. Of course, the main agenda for Russia is the applicable tax rates, as well as the verification of carbon units according to international standards (Table 7).

Table 7. Types of international standards.

International Standards	Geography of Application	Comments
Verified Carbon Standard (VCS)	World	Carbon tax in Colombia and South Africa, CORSIA
Gold Standard	World	Carbon tax in Colombia and South Africa, CORSIA
Clean Development Mechanism (CDM)	World	—
American Carbon Registry (ACR)	World	CORISA, Washington State CAR
Climate Action Reserve (CAR)	USA, Canada, Mexico	CORISA, Washington State CAR
California Compliance Offset Program	USA	California ETS (USA), Quebec ETS (Canada)
Australia ERF	Australia	Australia's Emission Reduction Fund (ERF) Safeguard
Alberta Emission Offset System	Alberta (Canada)	Alberta Technological Innovation and Emission Reduction Regulation (Alberta TIER)
China GHG Voluntary Emission Reduction Program	China	Pilot PTS in Beijing, Chongqing, Fuijian, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin, CORSIA
British Columbia Offset Program	Province of British Columbia (Canada)	Greenhouse Gas Industry Reporting and Control Act (GGIRCA)
J-Credit Scheme	Japan	STV Saitama
Thailand Voluntary Emission Reduction Program	Thailand	—
Spain FES—CO_2 Program	Spain	—
Fujian Forestry Offset Crediting Mechanism	Fujian Province (China)	Pilot STV in Fujian
Guangdong PU Hui Crediting Mechanism	Guangdong Province (China)	Pilot STV in Guangdong
Quebec Offset Crediting Mechanism	Canada	California ETS (USA), Quebec ETS (Canada)

Given the current trends and the established trend in ESG, many corporations are heading for environmentally friendly development, and in order to confirm the policy of sustainable development, attract additional investment in projects, they voluntarily participate in paid programs to reduce harmful emissions.

According to the Ecosystem Marketplace, the volume of CO_2 trading on the voluntary market is (Figure 2).

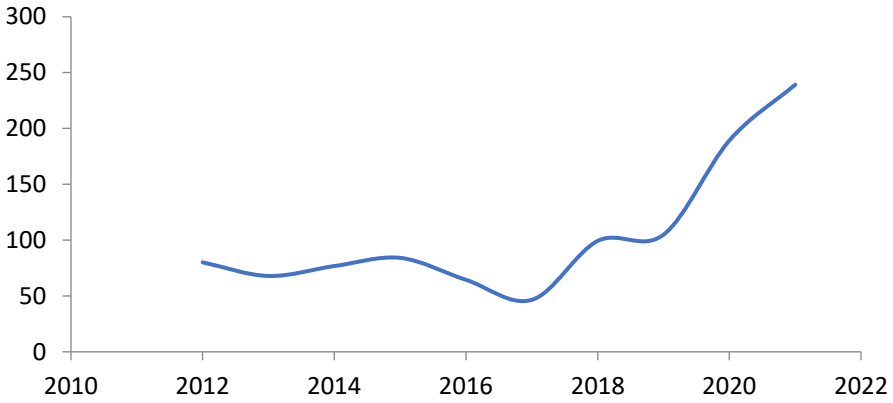

Figure 2. The graph illustrates the growing volume of CO_2 emissions trading on the voluntary market according to the Ecosystem Marketplace. The data are given in million tons eq CO_2.

We have seen a significant increase in the volume of voluntary trading in carbon units since 2017. Given the current trend towards decarbonization of their products, large enterprises will continue to support this trend in the future.

Issuance and repayment of carbon credits (independent and compliance standards) by year are from 2004 to present. Issuance and write-off of credits are reported by the American Carbon Registry (ACR), ART TREES, the Climate Action Reserve (CAR), California Air Resources Board (CARB), CDM (for credits issued after 2016), City Forest Credits, Climate Forward, Coalition for Rainforest Nations, EcoRegistry, Global Carbon Council, Gold Standard, Plan Vivo, ProClima and Verified Carbon Standard (VCS).

The world creates a turnover of carbon credits (carbon credits) using carbon credits. Carbon credits are permits for emissions into the atmosphere. Companies have quotas for emissions into the atmosphere, their dynamics is shown below (Figure 3).

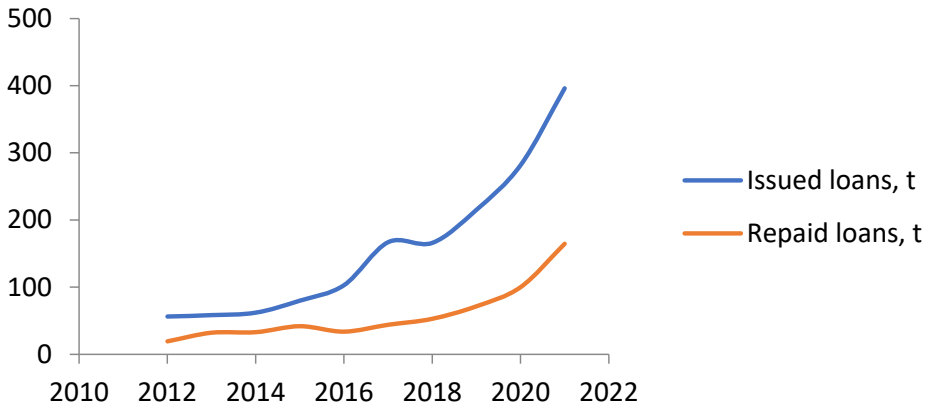

Figure 3. The illustrated dynamics of the issued quotas for CO_2 emissions shows a significant increase in demand for this regulatory instrument. Data according to the Ecosystem Marketplace.

In order to evaluate the overall emissions market by leading manufacturing countries, as well as the global market, we present the following data according to a BP study (Figure 4).

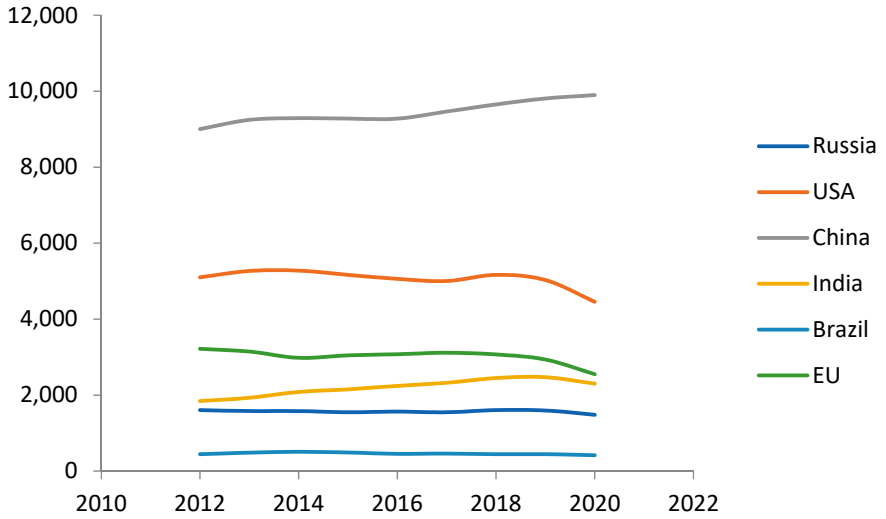

Figure 4. The illustrated dynamics of CO_2 emissions by the main producing countries shows the predominant influence of China on global CO_2 emissions. According to the graph, China is increasing CO_2 emissions by increasing production. Data according to the BP study, million tons.

Using the example of the main countries with the highest CO_2 emissions, we see that Russia is not the country with the highest carbon dioxide emissions, and China is the undisputed leader among polluting countries, followed by the USA and the countries of the European Union. At the same time, over the past 10 years, the dynamics of emissions of many countries has not changed, with the exception of the USA and the EU, which, as can be seen in the graph above, have been reducing their CO_2 emissions since 2018. China, on the other hand, has been increasing carbon emissions since 2016. In Russia and other countries, a weak dynamics of emissions can be traced, we can say that the volume of emissions does not change.

The supply and supply prices of carbon unit futures in involuntary and regulated markets have a significant difference in value. This is due to the fact that, of course, companies, although they want to maintain the status of "green" and follow the principles of sustainable development, but at the same time, if possible, do not spend big money on maintaining such a status.

Below are the values of carbon units in the voluntary and regulated markets (Table 8).

Table 8. Values of carbon units in the voluntary and regulated markets.

System	Price/tCO2e	Date	Source
California-Québec	USD 23.30	18 August 2021	California Air Resources Board
Chinese ETS Pilots:			
-Beijing	CNY 87.84 (USD 13.56)	30 September 2021	ICAP Allowance Price Explorer
-Chongqing	CNY 38.48 (USD 5.94)	30 September 2021	
-Guangdong	CNY 43.70 (USD 6.75)	30 September 2021	
-Shanghai	CNY 40.00 (USD 6.18)	30 September 2021	
-Hubei	CNY 40.86 (USD 6.31)	30 September 2021	
-Shenzhen	CNY 28.60 (USD 4.42)	30 September 2021	
-Tianjin	CNY 28.32 (USD 4.37)	30 September 2021	
-Fujian	CNY 14.30 (USD 2.21)	30 September 2021	
EU ETS	EUR 58.86 (USD 68.08)	12 October 2021	European Energy Exchange
Republic of Korea	KRW 30.100 (USD 25.26)	14 October 2021	Korea Exchange
New Zealand	NZD 64.80 (USD 45.03)	14 October 2021	Jarden CommTrade New Zealand
Nova Scotia	CAD 36.71 (USD 29.49)	9 June 2021	Nova Scotia, Department of Environment
RGGI	USD 9.30	9 August 2021	RGGI, Inc.
Switzerland	EUR 39.25 (USD 45.40)	10 March 2021	Schweizer Emissionshandelsregister

At the same time, the prices on the voluntary market in the period from 2016 to 2020 are in US dollars (Table 9).

Table 9. The prices on the voluntary market.

Countries	2016	2017	2018	2019	2020
Africa	4.1	5.3	4.3	3.9	4.2
Asia	1.6	2.3	3.1	1.8	1.2
Europe	1.2	1.7	4.8	3.1	6.1
Latin America	3.8	2.7	2.3	3.5	3.8
North America	2.9	3.5	2.9	3.6	6.2
Oceania	4.9	9.4	15.1	12.5	1.9

From the graphs above, in 2020, the cost of a carbon unit in Europe in 2020 is $6.1, and in the regulated market it is $68 as of 2021.

Russia is a party to the Paris Agreements of 12 December 2015 and the Kyoto Protocol of 4 November 2004. According to these documents, the countries participating in the agreements should strive to reduce anthropogenic greenhouse gas emissions, as well as create conditions for their capture and disposal. Create voluntary projects to achieve emission reduction goals. In order for the measurement of the amount of emissions to be comparable and the same in all countries, the so-called concept of a carbon unit is introduced, which is equivalent to one ton of CO_2 emissions. Verification procedures are carried out and records are posted in special registers. The carbon unit is currently a universal instrument of legal relations related to greenhouse gas emissions. It is by verified carbon units that the existing carbon footprint is determined and reports are created.

To date, the circulation of carbon units takes place on voluntary and regulated markets in accordance with applicable international standards in the field of climate projects.

For the first time, the "emissions market" reached the international level in 2005 after the start of the Kyoto Protocol, which provides for the following regulatory mechanisms for the participating countries:

- greenhouse gas emissions trading.
- a mechanism that allows the acquisition of carbon units in case of successful implementation of environmentally friendly projects in developing countries (clean development).
- joint implementation of climate projects, as a result of which the resulting carbon units are distributed among the participants of such projects.

Up until 2012, Russia implemented about 108 environmentally friendly development projects on its territory, as a result of which about 300 million carbon units were put into circulation. After 2012, Russia has not used the existing mechanisms of the Kyoto Protocol.

In addition to the projects existing under the Kyoto Protocol, voluntary climate projects have become widespread. Thus, thanks to the implementation of such projects, about 1.2 billion carbon units have been introduced in the world, most of which fall on the international standards VCS (Verified Carbon Standard), which is usually applied simultaneously with the CCB standard (Climate, Community and Biodiversity Standards) and the GS standard (Gold Standard).

The implementation of climate projects and participation in voluntary national accounting and verification standards allow companies to demonstrate their commitment to sustainable development, in turn, the results of such projects can be used for their own corporate development, attracting investors and the production of carbon units.

At the current moment, Russia is facing certain problems in the implementation of environmentally friendly projects, since national systems for accounting and verification of carbon units have not yet been created. When creating national systems, an important factor is the compliance of such systems with international standards and accreditation abroad, otherwise Russian enterprises will not be able to operate carbon units on world markets.

The main purpose of the formation and implementation of the Russian system of verification of climate projects is to create mechanisms through which sustainable development in the field of ecology becomes possible, as well as attracting so-called "green" investments in the economy.

Important principles of the formation of the Russian system of climate projects are:

- recognition and implementation of standards according to voluntary international standards.
- transparency of the mechanism and exclusion of the possibility of double accounting of carbon units (for example, on the territory of the Russian Federation and on the territory of the EU).
- absence of corruption component (personal interest, conflict of interests) between verifiers of carbon units and companies participating in the implementation of projects.
- recognition of carbon units by the civil code, as well as all possible operations, contracts with their participation.
- the possibility of state incentives for the implementation of climate projects.

The main issues to be determined are the definition of the tax base and the system of tax calculation. The tax base of the mineral extraction tax according to Article 338 of the Tax Code of the Russian Federation [20] can be defined as the value of extracted minerals, or as the amount of extracted minerals in kind. For greenhouse gas emissions, the tax base is applied as the number of tons of carbon dioxide equivalent emissions. The next even more significant issue is the tax rate. Since the tax base is calculated as the amount of CO_2 emissions, interest rates on the cost will not be suitable for calculation.

The basis for calculating the MET rate for natural gas production is clause 11 clause 2 of Article 342 of the Tax Code of the Russian Federation.

According to the Tax Code of the Russian Federation, the MET rate for natural gas production is calculated as:

$$NS*Eut*Cs + Tg \quad (1)$$

where

NS—the basic tax rate equal to 35 rubles per 1000 cubic meters of gas.
Eut—a unit of conventional fuel.
Cs is a coefficient that characterizes the complexity of mining.
Tg is an indicator that characterizes the costs of transporting combustible gas.

The proposed calculation formula has some similarities with the calculation of the MET rate.

The rate for emissions of 1 ton of CO_2-eq.

$$CO_2\text{-eq.} = BNS*Eug*Cs \quad (2)$$

where

BNS is the basic tax rate, which is approved by law.
Eug—a unit of conditional equivalent.
Kk is the coefficient characterizing the component composition of the gas.

Eug is determined by the following formula:

$$Eug = 0.7*(Cevr*Devr + Csrv*(1 - Devr))*R/BNS \quad (3)$$

where

Cevr—the average price of futures on European regulated markets for carbon units.
Devr—the share of products supplied to the European market.
Csrv is the average price of carbon units for the period in the international voluntary markets Verified Carbon Standard (VCS) and China GHG Voluntary Emission Reduction Program.
P—the average exchange rate of the US dollar to the ruble for the billing period.

For example, we will calculate the cost of 1 ton of CO_2-eq emissions.

As the value of the base tax rate, we take the 2000 rubles available in the draft regulatory documents for 1 ton of emissions.

The value of the methane content in the emissions will be taken to calculate the following: up to 1%—the value of Kks = 1, the methane content up to 5%—Kks = 1.3, the methane content over 5%—a coefficient of 1.5.

To calculate, we will take the average European price of futures for carbon units of 70 US dollars, the share of exported products to the European Union countries of 40%, the average price of carbon units on the voluntary market of 10%, the exchange rate is 100 rubles per US dollar.

With the accepted macroparameters, we obtain a coefficient of Eug = 1.19.

In total, the tax rate on CO_2 emissions is equal to $2000 \times 1.19 \times 1 = 2380$ for greenhouse gas emissions with a methane content of up to 1%, 3094 for emissions with a methane content of up to 5%, 3570 for emissions with a methane content of over 5%.

The proposed formula is more elastic, since it allows taking into account the share of exported products, world quotations for carbon units, the ruble exchange rate, the component composition of emissions. Taking into account the proposed formula will stimulate supply in the domestic market, as well as provide additional revenues to the budget of the budgetary system.

Thus, having studied the available information on the effect of carbon units on the world stage, the state should work out in detail and carefully the issue of verification and accounting of carbon units. Because in any case, in addition to voluntary standards, the countries participating in the Paris Agreements, in particular the countries of the European Union, will introduce national mechanisms to regulate the carbon footprint, and charge an additional tax on products that produced carbon dioxide emissions. All this will lead to significant additional revenues to the budget. However, the existing draft laws provide for the possibility of mutual accounting of carbon units with countries where verification of carbon units takes place according to accepted international standards. Thus, Russia has a chance to receive additional substantial budget revenues due to the carbon tax. Additionally, an important area for attracting investments is the possibility of attracting so-called "green" investments, which are aimed at implementing environmentally friendly projects. The participation of companies in improving the environmental friendliness of their products and reducing greenhouse gas emissions can provide a significant boost to the development of the economy. When determining the taxation mechanism, it is important to take into account the specifics of greenhouse gas emissions, namely the content of methane and other related gases. Taxation needs to be made flexible and understandable for businesses, taking into account global carbon unit futures quotes, including quotes on mandatory payments in the European Union, as well as quotes on voluntary global carbon unit markets. Different quotes should be taken into account, since there is a significant difference in the value of futures on regulated and voluntary markets. It is also necessary to take into account the share of exported products with the help of appropriate coefficients, which will help support the supply in the domestic market.

5. Discussion

Regulation of CO_2 emissions is currently being discussed by many experts. Many see this as additional opportunities and drivers of economic growth, while others believe that regulating emissions will entail an exceptionally excessive tax burden on consumers of goods and services. However, one way or another, all experts agree on one thing—emissions of CO_2 and other greenhouse gases must be reduced, because otherwise we will all face global climate change for the worse.

Cross-border regulation of carbon dioxide emissions in excess of quotas for carbon dioxide emissions in production, additional taxation of emissions, emissions of carbon dioxide and emissions in production in excess of quotas. This procedure produces not only at the enterprise, it includes production on the territory of the member states of the

European Union, but also for all imported goods based on them. The participation of natural resources in the natural nature of their products and the increase in greenhouse gas emissions can have a significant impact on the development of the economy.

Cross-border carbon regulation may turn out to be a new driver of the development of the Russian economy. It is important that the Russian side introduces a mechanism for tax regulation of CO_2 in a timely manner, otherwise there is a risk for Russian producers to become uncompetitive in the European market. It is worth noting that due to the increase in global production capacities, mainly due to the Asia-Pacific region, the dynamics of reducing CO_2 emissions is insignificant and does not meet the conditions of the Paris Climate Agreement. The Government also needs to determine how the additional fiscal burden will affect the purchasing power of citizens. We see that the main emitters of CO_2 in Russia and the world are large companies with traditional production, which are mining, for them the problem of switching to a green economy may be the significant size of the main fund aimed at traditional production. In our opinion, the optimal solution for the state would be to actively encourage companies to buy carbon units on the voluntary market in order to assess the real effect of the introduction of the practice of active carbon regulation. This practice, among other things, can help companies attract additional financing through "green" capital raising tools, since new generation investors actively participate in environmentally friendly projects.

The research hypothesis is that if exporting countries to the EU will be subject to an additional tax for excess CO_2 emissions, this will encourage companies to reduce their emissions, and countries will be able to replenish their budget at the expense of companies that do not pursue goals to reduce their emissions. The results of the study are directly useful and can be applied by the governments of exporting countries for their products in the form of using the developed mechanism of tax incentives to reduce CO_2 emissions.

6. Conclusions

The scientific article is devoted to possible mechanisms for regulating greenhouse gas emissions into the atmosphere on the territory of the Russian Federation. Today, the most important part of the development of any company, both foreign and domestic, is the sustainable development of ESG. Environmental issues are acute and relevant because life on earth will largely depend on ecology. The operations enshrined in the Kyoto Protocol must be carried out by all countries participating in the market. To date, there is an increase in the production of total emissions of non-gas gases. To better implement the Kyoto agreements, the European Union intends to introduce transboundary carbon regulation. The purpose of such regulation is to further stimulate producers to reduce greenhouse gas emissions and reduce greenhouse gas emissions from the environment.

Having studied the available information on the effect of carbon units on the world stage, the state should work out in detail and carefully the issue of verification and accounting of carbon units. Because in any case, in addition to voluntary standards, the countries participating in the Paris Agreements, in particular the countries of the European Union, will introduce national mechanisms to regulate the carbon footprint, and charge an additional tax on products that produce carbon dioxide emissions. All this will lead to significant additional revenues to the budget. However, the existing draft laws provide for the possibility of mutual accounting of carbon units with countries where verification of carbon units takes place according to accepted international standards. Thus, Russia has a chance to receive additional substantial budget revenues due to the carbon tax. Additionally, an important area for attracting investments is the possibility of attracting so-called "green" investments, which are aimed at implementing environmentally friendly projects. The participation of companies in improving the environmental friendliness of their products and reducing greenhouse gas emissions can provide a significant boost to the development of the economy. The article is of great interest to the scientific community, since the proposed mechanism for regulating the tax burden on companies producing products with CO_2 emissions has not been proposed before. Based on the proposed mechanism, which

includes the oil and gas industry and metallurgy, it is possible to further expand it and apply it to other industries that are regulated by CBAM: cement, organic chemicals and fertilizers. In general, the main task of the mechanism is to achieve the goals of the Paris Agreements, which has a significant positive impact on the global environment. Prospects for further research of the problems of state regulation of CO_2 emissions considered in the article will be aimed at using green financial instruments in order to stimulate the implementation of environmentally friendly projects.

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