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The impact of carbon regulation mechanisms on the development of industry in the Russian Federation

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ABSTRACT

The European Commission is currently preparing to implement a new form of carbon regulation - a cross-border carbon tax. As conceived by the authors, such a decision will force exporters of goods with a significant amount of greenhouse gas emissions during production to improve the environmental friendliness of production and, as a result, to reduce their carbon footprint. In addition, the carbon tax will create a competitive advantage for foreign companies with low greenhouse gas emissions.

Such a policy of the European Union can seriously affect the economy of the Russian Federation and Russian companies that are export-oriented. Today, all over the world, more and more importance is attached to environmentally neutral technologies and industries. To keep up with the global trend, as well as to maintain the level of competitiveness, the Russian economy needs to adapt. The speed and efficiency of adaptation directly depend on system solutions both at the state level (development of the necessary regulatory legal acts and standards for reporting and disclosure of information) and at the level of enterprises most sensitive to carbon regulation (audit of the carbon footprint, modernization of production facilities, responsible approach to neutralization carbon footprint).

The purpose of this work is to study the impact of carbon regulation mechanisms on the development of industry in the Russian Federation, in accordance with it, the following tasks are formed: to describe the mechanisms of carbon regulation, to assess the economic impact on the domestic industry, to consider world practices of confirming the carbon footprint, to identify threats to implementation of the national program "International cooperation and export" from the introduction of carbon regulation.

KEYWORDS:

carbon regulatory mechanisms, cross-border carbon tax, energy intensive industry development, carbon footprint, low carbon certifications.

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1. CARBON REGULATION

"Achieving the internationally agreed goal of not exceeding an increase in the average global temperature of more than two degrees Celsius requires much more ambitious decarbonization policies than those currently being implemented or are being prepared for implementation" [Levi, 2021]. It is noteworthy that various forms of carbon taxes have been used in countries and subnational governments for more than twenty-five years as an economic policy tool to reduce greenhouse gas emissions that contribute to global climate change. As of 2019, such taxes were introduced in 46 national and 28 subnational jurisdictions around the world, but their effect is estimated as insufficient [State and trends.., 2019]. In order to intensify the development of carbon regulation, many countries signed the 2015 Paris Agreement, which contains provisions on market mechanisms designed to help countries achieve their contributions to the total reduction of greenhouse gas emissions determined at the national level, increase ambitions and support sustainable development. So far, countries continue to work on the creation and formulation of these mechanisms. "Significant results have already been achieved in international aviation and shipping in terms of creating carbon market mechanisms as measures to prevent climate change. "Carbon Compensation and Reduction Scheme for International Aviation "(CORSIA) will be operational from 2021; International Maritime Organization (IMO) is also ready to implement a number of market-based measures as part of its strategy to reduce greenhouse gas emissions from global shipping"[1].

"Taking into account the current practice, according to the European Union's Emissions Trading Scheme (EU ETS) and the Regional Greenhouse Gas Initiative (RGGI), the highest risk for the carbon market is sharp fluctuations in the carbon price"[2]. Taking into account that carbon markets are formed artificially, pricing mechanisms in this market also have little in common with traditional market systems; pricing methods in such markets often involve price management from the outside, which makes the market and its participants dependent on the regulator and is a weak point that can disrupt the market structure, as well as weaken the effect of encouraging participants to reduce greenhouse gases emitted.

"The main objective of regulation within the carbon market is to stabilize market prices for carbon in the short term and reduce greenhouse gas emissions in the long term"[3]. External regulation consists of two mechanisms, quantitative and price. "Price mechanisms include the most common one: limiting the minimum price, while quantitative regulatory mechanisms can be similar to monetary policy operations on the open market: regulating the available reserve"[4].

"According to experts, the real reasonable cost of carbon emissions is from $ 80 to $ 300 per ton of CO_2 [Pindyck, 2019] or up to $ 417 per ton of CO_2"[Ricke et al., 2018].

The carbon tax as a form of carbon regulation based on market rules was developed in the United States under the Kyoto Protocol. The goal of reducing greenhouse gas emissions set out in the Kyoto Protocol was too ambitious,

[1] Carbon market mechanisms. URL: https://newclimate.org/expertise/market-mechanisms/.
[2] Ibid.
[3] Nonlinear dynamics in financial systems: Advances and perspectives. URL: https://www.hindawi.com/journals/ddns/2014/135818/.
[4] Ibid.

and the proposed mechanism of quotas for greenhouse gas emissions made this goal unattainable, while the carbon taxation mechanism was a less radical measure with an understandable market mechanism. "In addition, empirical studies of the impact of carbon taxes in the energy industry in the European Union have shown that carbon taxes are environmentally efficient, and increasing tax rates reduces greenhouse gas emissions in this sector. It has also been found that carbon taxes are more effective than emissions trading if they are levied for a longer time" [Hansjek et al., 2018].

However, at the beginning, the implementation of the carbon taxation mechanism did not meet the expectations: for example, a decrease in the actual carbon prices compared to the expected one led to a decrease in the motivation of participants in the development of "green" technologies and the fight against pollution. "For example, in Denmark and the Netherlands, the carbon tax rate has developed at about $ 14.3 and $ 25 per ton of carbon dioxide equivalent, respectively" [Yu, 2020]. The price ceiling mechanism did not reduce the marginal costs of implementing measures to reduce emissions and did not cope with the task of stimulating recipients to reduce greenhouse gas emissions. To compensate for the shrinking market, it was proposed to introduce a lower price threshold, which led to even greater market regulation and a reduction in market opportunities.

"To study the mechanisms for regulating the number of quotas and prices for them... the mechanism of regulation of the Chinese carbon market was analyzed on the basis of the classical risk neutralization system within the framework of the pilot operation of the Shenzhen carbon market" [Yu, 2020]. "However, as the experience of the European Union has shown, the rate of accumulation of carbon emissions was likely to increase the external impact on the market" [Yu, 2020].

The emissions trading scheme, launched in 2005 on the territory of the EU member states, is the first successful example, which is currently the largest in terms of the number of greenhouse gas emitters. Within the framework of the emission quota market, approximately 4% of the world's greenhouse gas emissions and almost half of all emissions from the energy, industrial and air cargo sectors of the economies of countries within the European Economic Area are traded. "EU ETS can be called quite effective: in 2018, greenhouse gas emissions in the sectors included in the program decreased by 29% compared to 2005; it is planned that in 2030 this indicator will be 43% lower than in 2005[5].

In the US, ten states in the northeast have adopted a joint emissions trading scheme. Companies of the fuel and energy complex (fuel and energy complex) undertake to participate in auctions on the principle of auctions for so-called permits for the emission of greenhouse gases. Thanks to the implemented mechanism, the volume of emissions in the fuel and energy sectors has decreased by almost half from the volumes of 2006-2008. At the same time, in order to reduce carbon emissions in the United States, a program has been implemented to modernize the generating facilities of thermal power plants to switch from steam power to a combined cycle of energy generation with the replacement of coal with gas as the main fuel. "However, the greatest effect of the program is achieved due to the mechanism of taxation on carbon emissions in the amount of 10-50 US dollars per ton of emitted CO_2, which, according to preliminary estimates, will reduce carbon emissions in the US electric power industry by about 10% per year" [Stevens, Carroll, 2020]. "In addition, solutions for the modernization of existing equipment with a significant carbon footprint are also a worthy solution on the way to reducing carbon emissions into the atmosphere, since they increase the amount of available capacity in the power system, which will be able to function up to 50 years in the future, and avoid attracting investment in the construction of new facilities that inevitably increase greenhouse gas emissions" [Joskow, 2006].

"Since 2011, China has been testing various designs of emissions trading schemes, and a National Quota Trading System is planned to be launched in 2021: it is expected that it will become the largest in the world in terms of the share of global greenhouse gas emissions[6]. covered." Attempts are also being made on carbon regulation in the CIS: for example, the Republic of Kazakhstan has been relatively successfully implementing a quota trading system since 2013, today 129 companies participate in the turnover of quotas.

It should be noted that the potential of emissions trading in terms of reducing greenhouse gas emissions is not unlimited. The implemented emission trading schemes make it possible to determine the current and permissible volumes of emissions, at the same time, the price of greenhouse gas emissions in an ideal market depends on the current demand for quotas. In the event of a significant decrease in demand, the price will also fall, which will reduce the attractiveness of the market, as well as the motivation of participants to further reduce their carbon footprint. To reduce the volatility of prices on the market, a possible solution may be the participation of state organizations that will artificially support demand and price during the downturn by buying out available quotas, which was successfully implemented in the European Union quota market after the global financial crisis.

The carbon tax, in turn, is a standardly defined tax rate for a conditional unit of greenhouse gas emissions or for exceeding the permissible value of emissions. "The carbon tax is already being used or is planned to be introduced in Argentina, Chile, South Africa, Japan, and many European

[5] How an eu carbon border tax could jolt world trade. URL: https://www.bcg.com/ru-ru/publications/2020/how-an-eu-carbon-border-tax-could-jolt-world-trade.
[6] Carbon regulation in the EU and the Russian Federation: an overview of current legislation. URL: http://www.nsplaw.com/ru/r/press-centr/novosti-i-sobytiya/uglerodnoe-regulirovanie-v-es-i-rf-obzor-tekushego-zakonodatelst/.

countries. Unlike emissions trading schemes, the tax sets a fixed price for carbon emissions, but at the same time does not guarantee the achievement of a predetermined level of emissions"[7].

"The carbon tax in Sweden was introduced in 1991 and is still the basis of climate change policy, covering about 40% of the country's greenhouse gas emissions. Sweden has the highest level of carbon tax in the world – in 2020 it amounted to 1190 Swedish kronor ($ 138) per ton of emissions" [Bobylev, Semeykin, 2020]. The carbon tax was implemented as part of the Swedish tax reform. However, the implementation of such measures inevitably places the burden of paying carbon taxes on citizens and small businesses with an insignificant level of income indirectly, through the purchase of energy resources and goods. "The researchers note that one of the ways to overcome the political difficulties associated with this in this case is to return part of tax payments to vulnerable industries and low-income segments of the population through subsidies" [Malerba et al., 2021]. The government has implemented similar support measures for citizens and industry in Sweden, involving state subsidies to pay for energy resources that have become more expensive due to the introduction of a carbon tax. Thanks to an adequate pricing policy, as well as support for the most sensitive industries, Sweden's GDP grew to 78% between the 1990s and 2010, while reducing specific emissions by more than 25%. The success achieved confirms the possibility of reducing greenhouse gas emissions by up to 100% by 2045.

In the UK, the carbon tax has been in effect since 2013 and is 18 pounds per ton of CO2 equivalent. "This has helped to significantly reduce the consumption of coal-fuel, which is the most typical and heat-intensive energy resource in this region: from 2013 to 2019, the share of energy produced by burning coal decreased from 40 to 3%. In 2018, Argentina introduced a carbon tax, in 2019 – Canada, South Africa" [Malerba et al., 2021].

It should be noted that in December 2019, the European Commission adopted a message on the European Green Course, the implementation of which is planned for 2021. Key measures envisaged under this program include a proposal for a Carbon Border Adjustment Mechanism (CBAM) for individual sectors. The commission's preparatory work includes an initial impact assessment in March 2020. Public consultations – an analogue of public discussion – were held from July 22 to October 28, 2020[8].

On September 16, 2020, Commission President Ursula von der Leyen announced a legislative proposal for CBAM among the key new initiatives for 2021. In its work program for 2021, the commission plans to submit proposals for a mechanism for adjusting carbon boundaries and the mechanism itself as an own mechanism of the European Union in the second quarter of 2021. The Parliamentary Committee on Environment, Public Health and Food Safety (ENVI) is preparing a report on its own initiative, entitled "Towards a WTO-compatible mechanism for adjusting the EU's carbon borders".

The proposed measures, called the European Green Course, aim to reduce greenhouse gas emissions in the European Union by 50% over the next decade (compared to the current target of 40%) and make Europe the world's first climate installation[9].

However, the roadmap for achieving these ambitious goals includes a provision that is likely to have serious consequences for the EU's trading partners. The EU is considering the possibility of introducing a mechanism for adjusting the carbon emission limit, which is more often called a cross-border carbon tax[10]. It will reflect the amount of carbon emissions associated with goods imported to 27 countries. Producers in countries with EU-compliant carbon pricing mechanisms may be exempt from this.

Although this policy has politically significant supporters in Europe, it will create serious short-term problems for companies with high greenhouse gas emissions and will become a new source of disruption to the global trading system, already subject to "tariff wars", revised treaties and growing protectionism. "On the other hand, it should be noted that carbon taxes can stimulate the exchange of low-carbon technologies between external enterprises, which is a key achievement in reducing emissions" [Wang et al., 2019]. According to preliminary estimates, a tax on imports to the EU of $ 30 per metric tonof CO_2 emissions – as one of the possible scenarios - could reduce the profit pool of foreign producers by about 20% if the price of crude oil remains in the range of $ 30 to $ 40 per barrel. The application of the tax can reduce the profit from imported metallurgical products, in particular, by an average of about 40% [Wang et al., 2019].

In some sectors, a cross-border carbon tax can change the terms of competitive advantage. European manufacturers may find that the cost of Chinese or Ukrainian steel produced in blast furnaces is now less profitable compared to the cost of the same type of steel from countries that use more environmentally friendly production methods. Similarly, European chemical producers can reduce their dependence on Russian crude oil and import more from Saudi Arabia,

[7] Ibid.
[8] Carbon border adjustment mechanism as part of the European Green Deal. URL: https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-border-adjustment-mechanism.
[9] Ibid.
[10] Carbon footprint: Current methods of estimation. URL: https://www.researchgate.net/publication/46289480_Carbon_Footprint_Current_Methods_of_Estimation.

where production involves fewer cleaning procedures and leaves a smaller carbon footprint. If several cleaner sources of supply are available, EU companies may face a choice: either absorb the added value of the tax, or transfer it to consumers lower down the consumption chain.

The concept of carbon taxation as a means of providing enterprises with a financial incentive to reduce greenhouse gas emissions has been proposed by many experts for decades, and not only in Europe. In fact, more than 3,000 US economists and all the living former chairmen of the Federal Reserve System have approved a carbon tax.

However, until now, a cross-border carbon tax has rarely been introduced. It is also not clear how this policy will work in practice. The European Commission is currently studying several options, each of which has its own advantages and disadvantages. The EU may exempt some countries that already have similar carbon pricing schemes. This can be done by entering into new preferential trade agreements or updating existing ones, for example, with Australia, Canada or Japan.

"In Russia, carbon regulation is in the process of being formed – the preparation of a draft federal law on state regulation of greenhouse gas emissions is under the jurisdiction of the Ministry of Economic Development. As part of the action plan of the Government of the Russian Federation to prepare for the ratification of the Paris Agreement, the country should take economic measures to stimulate the reduction of greenhouse gas emissions. Carbon regulation, according to the former head of the Rusnano Criminal Code Anatoly Chubais, – the most difficult, but urgent issue of the entire system of climate measures[11].

The chronology of the development of Russian lawmaking on the introduction of a carbon tax[12] is as follows.

1. Since 2015, the Government of the Russian Federation has been studying the possibility and preparing a regulatory framework for regulating greenhouse gas emissions.

2. In 2016, the Russian side signed the Paris Climate Agreement, and in 2019, the agreement was adopted by the Duma.

3. Government Decree No. 2344-r of 03.04.2016 approved the "Plan for the implementation of a set of measures to improve state regulation of greenhouse gas emissions".

4. In 2017, the Ministry of Economic Development of the Russian Federation developed and submitted to the Government of the Russian Federation a draft federal law "On regulating the volume of greenhouse gas emissions in the Russian Federation". However, the project was repeatedly sent for revision due to interdepartmental disagreements.

5. The final version of the draft Federal law, sent for consideration, established the maximum permissible amount of direct greenhouse gas emissions for enterprises, amounting to 150 thousand tons ofCO_2 equivalent. In case of exceeding the permissible values, the draft federal law assumed the collection of the so-called carbon fee from 2025. However, the proposed project was not approved at a meeting of the Federation Council and sent for revision.

6. In 2019, the World Bank recommended that Russia consider the possibility of introducing carbon taxes or other mechanisms for economic incentives to reduce emissions.

7. In 2020, the Ministry of Economic Development of Russia submitted a new draft federal law on carbon regulation to the Government of the Russian Federation.

8. In November 2020, the Decree of the President of the Russian Federation No. 666 "On reducing greenhouse gas emissions" was issued, according to which the Government of the Russian Federation was instructed to ensure a reduction of greenhouse gas emissions to 70% of the 1990 level by 2030.

The National Security Strategy and the Energy Security Doctrine approved by the President pay special attention to the development of the economy and ensuring the economic security of Russia. At the same time, these documents define the challenges to the energy security of the Russian Federation and indicate the need to strengthen international cooperation in the implementation of climate conservation policies, as well as accelerate the transition to a "green" economy.

2. ASSESSMENT OF THE ECONOMIC IMPACT ON THE DOMESTIC INDUSTRY FROM THE INTRODUCTION OF A CARBON TAX ON IMPORTS TO THE EU

The carbon market is not yet a fully developed mechanism in the Russian Federation, since serious work on its creation began several years ago. Currently, it is assumed that the state will participate in the creation of

[11] "On the concept of state regulation of greenhouse gas emissions and removals in the context of the strategic goals and objectives of the Russian Federation". URL: http://council.gov.ru/activity/activities/parliamentary/110697/.
[12] Ibid..

trading platforms, and the provision and control of their activities will be transferred to specialized non-profit partnerships. It is expected that the main participants will be large energy-consuming enterprises, as well as non-residents of the Russian Federation carrying out economic economic activities on the territory of the country. The main challenge of the carbon market is the appropriate allocation of quotas. "An economically reasonable price for carbon emissions can contribute to an effective reduction of carbon emissions, at the same time, excessively high prices lead to a slowdown in economic growth, which only underlines the importance of the current pricing policy in carbon markets" [Shi et al., 2019].

According to experts, the carbon tax as a form of carbon regulation seems to be the most promising solution due to the ease of implementation, the availability of existing infrastructure and the transparency of the mechanism, since tax mechanisms are used in all financial systems of the world. At the same time, there are naturally concerns about the expedient formation of the tax rate. In case of non-compliance with the balance of interests, the incentive mechanism for reducing emissions can limit entrepreneurial activity and create discriminatory conditions for a large number of participants.

"There is a list of exceptions on the carbon market – for example, in the European Trading System, energy-intensive enterprises (steel, aluminum, etc.) have the right to receive up to 100% of quotas free[13]. of charge." At the same time, this right is granted to an economic entity only if the lowest value of greenhouse gas emissions established for the industry in which the activity is carried out is observed. However, this mechanism for supporting energy-intensive enterprises creates discriminatory conditions for enterprises operating on the territory of the European Union, completely freeing large consumers and obliging others to pay. Despite the obvious discriminatory nature, this measure is not canceled, as it is aimed at preventing the transfer of production chains to countries without carbon regulation. According to consumers, the best solution is to introduce unified universal carbon regulation mechanisms around the world, which is not yet possible.

Studying the world experience, the Ministry of Natural Resources of Russia notes that the tendency to change the structure of demand for energy resources, as well as the acceleration of the pace of development of energy-saving and carbon-neutral technologies pose serious challenges to the economic and energy security of the country. "In this regard, the measures for low-carbon development and "carbon protectionism" planned and adopted by the main trading partners of the Russian Federation should, of course, be taken into account when determining the trajectory of development not only of the fuel and energy complex, but also of the Russian economy as a whole" [14].

The carbon tax on products imported into the European Union is intended to support and increase the competitiveness of European producers whose products (due to the rejection of traditional energy carriers) have lost their price attractiveness. At the same time, the decision to switch to more expensive energy sources and reduce the material intensity of the EU economy was dictated by the political task of stopping the use of resources, the production of which became economically unprofitable on the territory of the EU, since there was a critical dependence on the import of such resources from competing jurisdictions[15]. For example, the cost of hydrogen iron reduction technology is five times higher than the cost of traditional technology, but hydrogen hydrolysis is economically inefficient on the territory of the European Union, and therefore the technology has practically not been used.

Given that the fuel and energy sector is based on the use of hydrocarbons, the carbon tax is expected to be used also to combat Russian hydrocarbons. Against the background of US efforts to put pressure on the European Union to abandon the Nord Stream gas pipeline and replace Russian gas supplies with liquefied American gas, the issue of cross-border carbon regulation is becoming particularly relevant for the Russian Federation.

The introduction of cross-border carbon regulation, in its essence, is an element of pressure on the economic sovereignty of the EU trading partner countries, since it encourages them to accelerate the implementation of similar models of carbon regulation using fiscal and restrictive mechanisms. The result of this approach may be the loss of price advantages of products produced using traditional energy resources. For Russian export-oriented sectors of the economy, especially energy-intensive industries (heavy machinery, metallurgy) and the oil and gas industry, such measures will be deliberately discriminatory and will lead to significant financial losses. In this regard, ensuring the stability of the domestic economy as a whole and separately the economic conditions for the functioning of the fuel and energy sector against the background of the EU plans to introduce a carbon tax becomes a priority[16].

At the same time, it should be noted that at the beginning of 2021, the regulatory and legal framework, as well as infrastructure mechanisms for an alternative way of confirming the carbon footprint-"low – carbon certificates" are significantly more developed than carbon taxation. Thus, the Ministry of Energy of the Russian Federation has developed a draft Federal Law "On Amendments to the Federal Law "On Electric Power Industry"" in connection with the introduction of certificates of origin of electric energy. In accordance with it, it is planned to introduce

[13] Russia is preparing to use economic levers to reduce greenhouse gas emissions. URL: https://bellona.ru/2019/06/27/uglerod-russia/.
[14] Ibid.
[15] Ibid.
[16] Ibid.

certificates of origin of electric energy into circulation, which will be issued upon the production of electric energy at qualified low-carbon generating facilities and at the present moment is actually the only possible way to confirm low-carbon consumption.

However, this mechanism also carries significant risks for the manufacturing industry of the Russian Federation. According to experts, low-carbon certificates, based on the current price level in Europe, will cost about 20 kopecks./kW * h. Taking into account the level of tariffs for consumers connected at a high voltage level, the turnover of certificates on the proposed conditions will lead to an additional increase in the costs of exporters for electric energy up to 5-10%. At the same time, such an increase in costs will be especially significant for energy-intensive industrial enterprises. One of the most sensitive industries in this case is the metallurgical and chemical industries. With regard to electrometallurgy, experts say that the cost of aluminum production will increase by at least 3.2 thousand rubles/ton. The cost of production of electrolytic copper will increase by 0.6 thousand rubles/t, electrolytic nickel - by 0.8 thousand rubles/t, steel-by 0.1 thousand rubles/t. The production of fertilizers will also significantly increase in price, for example, the cost of ammonia obtained by electrolysis and nitrogen will increase by 2.2-2.4 thousand rubles/t.

According to preliminary estimates, the introduction of a cross-border tax will have the greatest impact on such areas as petrochemicals, metallurgy and fertilizer production. At the same time, it should be noted that the carbon regulation policy proposed by the European Union will have an impact not only on carbon-intensive and electricity-intensive production, but will indirectly affect all sectors of the Russian economy. It is logical to assume that the introduction of a carbon tax on imports of goods to the EU will also entail an increase in the cost of other Russian goods that are not taxed, which, of course, creates risks of losing export markets in the EU countries. "For example, for producers of nitrogen fertilizers, the carbon fee can become prohibitively high, reaching 40-65% of the current export value of fertilizers. Due to the higher carbon intensity (deep oil deposits), Russia may cede part of the EU oil market to Saudi Arabia due to a decrease in profitability"[17].

3. GLOBAL PRACTICES FOR CONFIRMING THE CARBON FOOTPRINT

Currently, the greenhouse effect is considered a key factor of climate change. The increase in global temperature is due to the anthropogenic release of greenhouse gases into the atmosphere. The gases listed in the Kyoto Protocol, whose emissions increased by 70% in the period 1970-2004, have a significant impact on the global temperature increase[18]. "After the British Industrial Revolution, economic production entered an era of rapid development in order to meet the growing demand for market capacity and keep up with the pace of social development" [Ashworth, 2008]. "Industrial production stimulated economic and social development, but also led to an increased environmental burden, for example, as a result of the production of electronics" [Nnorom, Osibanjo, 2008]. Since then, the growth rate of greenhouse gas concentrations has continued to increase, far exceeding the natural range.

As most countries develop economically, more and more fossil fuels are consumed, and the carbon emissions associated with them are an important problem worldwide. "In 2018, global energy-related carbon emissions rose to a new record of 33.1 Gt, which fell to 33 Gt in 2019. "In 2019, energy-related carbon emissions in the United States, Germany and Japan fell by 2.9%, 8% and 4.3%, respectively, but carbon emissions outside the developed economies increased by almost 400 Mt, with almost 80% of the increase accounted for China, India and other Asian countries" [Wei, 2021]. The largest share of these greenhouse gases comes from the burning of fossil fuels in the form of CO2 (58.6%). The concentration and emissions of greenhouse gases are monitored and recorded worldwide, but the available information on the carbon footprint is often associated with uncertainty and inconsistency. To calculate the carbon footprint, the product life cycle is studied, which includes all the stages associated with it - its production from the delivery of raw material to the final packaging, distribution, consumption and use.

Currently, all anthropogenic sources of greenhouse gas emissions are divided into four sectors of the economy: energy, industrial processes and product use, agriculture, forestry and other types of land use, as well as waste.

Currently, there are many standards and guidelines for accounting for greenhouse gases, but the most common are the following [Wei, 2021].

1. Protocol on Greenhouse Gas Emissions of the World Resources Institute (WRI) / World Business Council for Sustainable Development (WBCSD).

[17] Russian exporters may suffer due to the tightening of environmental standards in Europe. URL: https://www.vedomosti.ru/business/articles/2020/02/09/822592-rossiiskie-eksporteri.
[18] Carbon footprint… URL: https://www.researchgate.net/publication/46289480_Carbon_Footprint_Current_Methods_of_Estimation.

2. ISO 14064, an international standard for defining boundaries, quantifying greenhouse gas emissions and displacement.

3. Publicly Available Specifications-2050 (PAS2050) of the British Standards Institute (BSI): they define the requirements for estimating greenhouse gas emissions during the life cycle of goods and services (BSI 2008).

In addition to these standards, domestic exporters, like their foreign competitors, use internationally recognized methods, including Greenhouse Gas Protocol (GHG Protocol), when determining the amount of indirect energy emissions. At the same time, similar calculation methods are now laid down in the Order of the Ministry of Natural Resources and Ecology of Russia No. 330 dated 29.06.2017, as well as in GOST 56267-2014.

4. THE MAIN RUSSIAN EXPORTERS AFFECTED BY THE CARBON TAX ON IMPORTS, AND THE CONSEQUENCES FOR THEM

In 2021–2027, the European Commission expects to receive from the application of cross-border carbon regulation from 5 to 14 billion euros per year. The "carbon tax" is designated as one of the sources of financing for a large-scale (about 750 billion euros) financial assistance plan to bring the EU economy out of the crisis caused by the coronavirus pandemic[19].

According to the estimates of the audit company KPMG, the price burden on Russian exporters will be from 6 to 50.6 billion euros annually. According to the estimates of the Institute of National Economic Forecasting of the Russian Academy of Sciences, the financial losses of Russian exporters from the introduction of cross-border carbon regulation by the European Union may amount to 2.8–3.6 billion euros per year (at a price per unit of emissions of 20–25 euros per ton of CO_2 equivalent, taking into account only direct emissions)[20]. However, it should be borne in mind that this analysis included a wide range of goods, including those subject to the issuance of free quotas in the European Union. The most realistic option seems to be the introduction of cross-border carbon regulation for a narrow range of products. Thus, the total annual costs of Russian exporters will amount to about 1 billion euros, which will significantly change the existing level of the actual fiscal burden for the industries that have fallen under such regulation (metallurgy, energy, chemical industry).

The cross-border carbon tax imposed on the territory of the European Union creates significant challenges for the domestic economy and domestic companies focused on exporting products, since the most sensitive industries to carbon regulation are hydrocarbon production and metalworking, whose products, according to the Federal Customs Service of Russia, accounted for 74% of all goods exported to the countries in 2019The European Union. "The negative assessment of the impact of the cross-border carbon tax on Russia is also confirmed in the materials of the Boston Consulting Group (BCG) and KPMG"[21].

According to BCG's analysis, the carbon regulations introduced by the European Union will work for 100–160 million tons of carbon-intensive exports, while the list of industries proposed for taxation does not affect less carbon – intensive industries, but even in this case leads to a significant increase in the tax burden of Russian exporters-about $ 4.8 billion annually.

The proposed approach to carbon regulation is quite capable of changing the structure of imports to the European Union in most sectors of the economy. For example, the process of oil production in Saudi Arabia has a much smaller carbon footprint compared to oil production in Russia for many reasons, which definitely deprives Russian oil of a market advantage in terms of price and environmental image. "According to BCG analysts, the oil and gas industry accounts for 45-53% of all carbon emissions of Russian exporters, or 45-84 million tons of CO_2, and from 2022 companies will have to pay $ 1.4-2.5 billion a year as a tax fee" [22].

In addition to the production of hydrocarbons, domestic producers of pulp and paper products and fertilizer producers, whose production chains are also associated with significant amounts of greenhouse gas emissions, expect similar consequences for reducing competitiveness.

A number of experts express the opinion that "from the company's point of view, carbon taxes are considered as the company's production costs, which affect its sustainable competitive advantages, but effective production or infrastructure solutions can potentially have a positive impact on profitability" [Kuo et al., 2016], so some domestic industrial companies in the field of metalworking with traditionally low production costs due to the availability of production facilities in regions with cheap electricity can potentially gain a competitive advantage in European markets by increasing the costs of introducing a carbon tax from competitors from other countries with their subsequent displacement from European markets. "At the same time,

[19] Russian exporters may suffer… URL: https://www.vedomosti.ru/business/articles/2020/02/09/822592-rossiiskie-eksporteri.
[20] Ibid.
[21] Ibid.
[22] Ibid.

BCG estimates that the fee for metallurgical and mining companies will amount to $ 0.4-0.6 billion per year, since they account for 25-30% of export emissions" [Kuo et al., 2016].

It is obvious that such a size of tax payments will offset the cheapness of electric energy and significantly worsen the financial well-being of domestic metallurgical companies due to a decrease in export revenue and will create a serious threat of losing sales markets. If indirect energy emissions are also included in the basis for calculating fees within the framework of cross-border carbon regulation, its discriminatory nature in relation to Russian products may increase due to the structural features of the Russian energy supply system.

Compensation projects can be an important business area for Russia, given the global nature of climate issues and Russia's potential for the development of such areas as reforestation and conservation of boreal forests. At the same time, the current version of the draft European climate law does not imply the use of cross-border offset projects to compensate for emissions in the European Union. Such projects should be implemented on the territory of the EU[23]. This means that today the federal executive authorities involved in the formation of Russia's climate policy and representing it on international platforms should step up efforts to adopt industry-specific methods for calculating the carbon footprint of products, taking into account both direct and indirect emissions, as well as the results of the implementation of compensation projects. In addition, it is becoming extremely important to ensure the early implementation of the Russian system for verification and validation of greenhouse gas emissions reductions, integrated into the international system.

The introduction of cross-border carbon regulation should be considered in the general context of the Green Pact program for Europe ("Green Deal"), which is aimed not only at reducing greenhouse gas emissions, but also at reducing the EU's dependence on energy supplies from non-member countries. The mechanism of carbon regulation in an unfavorable format for energy carriers, especially in combination with other elements of the "Green Deal" (primarily with climate regulation), can create additional pressure on consumers in the European Union[24]. This, in turn, will negatively affect the levels of consumption of Russian energy resources on European markets. It should also be taken into account that the "Green Deal" pays considerable attention to the development of "ecological" gases within the EU. In a number of ENTSOG forecasts (although the most aggressive), the share of gas imported to Europe is reduced to 10-20% due to the transition of European energy to "green" hydrogen, obtained on the basis of water hydrolysis using wind and solar generation energy[25]. At the same time, the negative effects for the exporting countries of traditional energy carriers are obvious.

5. THREATS TO THE IMPLEMENTATION OF THE NATIONAL PROGRAM "INTERNATIONAL COOPERATION AND EXPORT" FROM THE INTRODUCTION OF CARBON REGULATION

The Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation until 2024 and for the Period up to 2035 (hereinafter referred to as the Strategy) defines the main directions of the state industrial policy in relation to a set of economic activities related to manufacturing and under the jurisdiction of the Ministry of Industry and Trade of the Russian Federation. "According to the Strategy, the implementation of the state industrial policy in the main areas will contribute not only to the development of the country's industrial potential, but also to increasing the flexibility of responding to threats in the field of economic, environmental and biological security"[26]. The provisions of the Strategy assume the development of the domestic market and domestic technologies for the subsequent development of export directions with the unconditional provision of national security.

However, the implementation of the new policy by the EU may reduce the competitiveness of the manufacturing industry, which will hinder the implementation of the strategy. The positions of industrial production will become less noticeable on the world market, and export diversification will decrease.

"The scale of consumer demand is limited by the low income level and the total population of Russia in comparison with developed countries. Business demand for means of production is potentially high, but in fact it is small due to the observed investment pause (the increase in investment in fixed assets in 2019 was 1.7% compared to the level of 2018)" [27]. It is obvious that domestic sales markets seem to be a priority for the sale of goods and the assessment of demand for products, since competition is limited by a small number of participants, and the proximity of production capacities and the market remains.

[23] How the new EU carbon tax will hit Russian exports. URL: https://thebell.io/kak-novyj-uglerodnyj-nalog-evrosoyuza-udarit-po-rossijskomu-eksportu.
[24] Ibid.
[25] Ibid.
[26] Decree of the Government of the Russian Federation No. 1512-r dated 06.06.2020 "On approval of the Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation until 2024 and for the period up to 2035". URL: https://www.garant.ru/products/ipo/prime/doc/74142592/.
[27] Like the new EU carbon tax ... URL: https://thebell.io/kak-novyj-uglerodnyj-nalog-evrosoyuza-udarit-po-rossijskomu-eksportu.

However, such an approach significantly reduces the pace of development of foreign economic relations, although it contributes to ensuring the national security of the country by reducing import dependence.

Nevertheless, environmental friendliness is becoming a key trend in the development of economies. In the near future, the control of the carbon footprint will become one of the factors shaping the economy of industries and countries. Thus, the speed of adaptation to the changing rules will determine new market leaders in energy-intensive industries, as well as allow a number of domestic companies to gain a competitive advantage in international markets.

It is obvious that the Chinese government has shown the greatest foresight. The country is implementing a proactive approach to the development of carbon regulation. Being, in fact, the largest exporter of energy-intensive raw materials and products, China fully appreciated the emerging threat to the national economy. Since 2013, the Chinese government has been conducting an active dialogue with the organizers of the European System for Trading emissions quotas, starting from the organization of a political dialogue and ending with the creation of an infrastructure for interaction with the European carbon market. "Since 2018, cooperation between the EU and China has been conducted on the basis of the ECPDD platform (the EU – China platform for political dialogue on emissions trading). Already in the current 2021, it is planned to launch the Chinese ETS, the creation of which has been carried out with the expert support of the EU since 2014. Electricity production is the first of the industries that will be affected by the innovations, and this is not surprising: the emissions of this industry alone are almost twice the total emissions regulated by the EU ETS" [28].

It is obvious that the Government of the Russian Federation and large industrial companies need to accelerate the development and implementation of proactive actions in the following areas.

Five key areas of proactive action for the Russian Government

1. Ensuring transparency: developing a regulatory framework for standards for measuring and reporting greenhouse gas emissions, as well as mechanisms and goals for reducing emissions (which corresponds to the Paris Agreements signed by Russia) and ensuring transparency for all participants.

   Russia has already developed and adopted standards for measuring greenhouse gases and corresponding GOST standards, but a draft federal law that would establish the obligation of legal entities to report on greenhouse gas emissions is under discussion, and there is also no standard reporting form.

2. Creation of an internal mechanism for regulating the carbon market: implementation of a mechanism for regulating greenhouse gas emissions through the introduction of a state carbon tax or the creation of a Russian emissions trading system similar to the EU ETS exchange. In this case, thanks to the EU ETS policy, mutual accounting of emissions is possible under a number of conditions.

3. External synchronization: revision of the regulatory system, formation of requirements, standards, conditions and incentives that meet EU/international requirements, work with European regulators to synchronize conditions.

4. Support for strategic industries: at the first stages, they are subsidized, designed to adapt companies to the gradual neutralization of the carbon footprint.

5. Export diversification: the formation of prerequisites for the diversification of trade turnover of large exports and the expansion of sales markets.

Five key areas of proactive actions for Russian exporting companies.

1. Impact measurement: it is necessary to develop and implement mechanisms, systems and standards for measuring and reporting on the company's carbon footprint, to work on disclosure of information in accordance with the standards for obtaining tax benefits.

2. Changing technologies and production methods to reduce the company's carbon footprint.

3. Participation in the formation of the regulatory framework: companies should actively participate in the development of policies so that the final version of the carbon pricing mechanism protects their interests and provides a competitive advantage.

4. Maintaining internal accounting using conditional carbon prices, using the results for decision-making, assessing the sustainability of production under various scenarios of CO_2 prices.

It should be noted that the largest energy-intensive producers on the territory of the Russian Federation are already actively working to compensate for the environmental impact, as well as to reduce the risks from the introduced local carbon regulation measures. Domestic metallurgical and oil producing companies regularly conduct a "carbon audit" and publish information on specialized platforms on sustainable development, as well as in annual corporate reports. Nevertheless, manufacturers are actively criticized for insufficient elaboration of reports, as well as for the inability to confirm the actual data due to the lack of

[28] Ibid.

mechanisms for accounting for emissions in the territory of the Russian Federation. It is obvious that in order to achieve the greatest effect from the measures taken, it is necessary to cooperate between the state and private companies both in approving the methods of carbon accounting and regulation, and in supporting the most sensitive industries.

It is fair to note that the Government of the Russian Federation has also stepped up its activities in this direction. Thus, in compliance with international climate agreements, the sustainable development goals were defined at the national level, as well as goals related to climate change, including their adaptation and integration into the national development goals until 2030. The Ministry of Economic Development of the Russian Federation has developed the concept of a "green bond market", and the Ministry of Energy of the Russian Federation has developed a federal law on low-carbon certificates, which assumes accounting for electric energy produced at generating facilities with a neutral carbon footprint.

In order to support the measures taken by the government, the Bank of Russia is developing approaches to ensure transparency of information, as well as measures to attract investment in the "greening" of domestic production. Together with the Government of the Russian Federation, the Bank of Russia is involved in the development of the domestic "green bond market", as well as in international work aimed at identifying risks associated with climate change and developing recommendations for their elimination.

6. CONCLUSION

The threat of climate change in itself is a serious risk for companies and the financial sector, since the number and frequency of natural disasters that destroy infrastructure and local economies has significantly increased over the past twenty years. However, the proposed measures to combat climate change often pose no less a threat to industry and enterprises around the world. In this regard, climate risks have been one of the key agendas for several years, both at the state and at the business level.

The chaotic and inconsistent actions on international carbon regulation, as well as new epidemiological factors, force countries to take their local measures to compensate for both the carbon footprint and the consequences of the measures taken by their economic partners. However, the European cross-border carbon tax, due to its uniformity and great support, seems to be a worthy solution for the European Union in the areas of carbon regulation and recovery after the global epidemic. At the same time, the Russian economy may undergo significant changes and negative consequences from the introduction of these measures.

In compliance with the provisions of the 2015 Paris Agreement, the Russian Government has developed a Strategy for the long-term development of Russia with low greenhouse gas emissions until 2050. According to the adopted Strategy, there are basic and intensive scenarios for low-carbon development of the Russian Federation. The provisions of the Strategy provide for the creation of a regulatory and methodological framework for low-carbon transformation of the economy, including the regulation of greenhouse gas emissions at the national level. In addition, the Government of the Russian Federation is developing a draft federal law on carbon regulation, the provisions of which are supposed to subsidize the development and implementation of" green " technologies, as well as the creation of a system for verifying carbon reporting of companies.

Taking into account the preliminary estimates of experts, the consequences of the measures taken for the structure of domestic and international markets will be significant, since the greatest changes are expected in the sectors of oil refining, metallurgy, mining and chemical industry. Thus, the payment of a cross-border carbon tax will reduce the profitability of supplying only crude oil to the EU countries by an average of 20% , while maintaining current prices.

Taking into account that almost half of Russian exports of goods are focused on EU countries, the cross-border carbon tax will become a significant new challenge for Russian exporters. It is obvious that to compensate for the cost of carbon duties, the cost of domestic goods in the energy and metallurgical industries will increase, which in turn will negatively affect the competitiveness of Russian products on international markets.

In order to avoid losing competitive positions, domestic producers need to take an active part in the development of standards and systems for accounting for greenhouse gas emissions both within companies and at the state level with unconditional compliance with international reporting and disclosure requirements. Attracting investments in the development of low-carbon technologies and an active position on their implementation by major greenhouse gas emitters will also have a significant impact on the adaptation of the Russian economy.

REFERENCES

1. Bobylev B., Semeykin A. (2020). «Zelenyy» protektsionizm Evropy [Low carbon protectionism in Europe]. *Energeticheskaya politika [Energy Policy]*. URL: https://energypolicy.ru/zelenyj-protekczionizm-evropy/gaz/2020/14/14/.
2. Ashworth W.J. (2008). The ghost of rostow: Science, culture and the British industrial revolution. *History of Science; an Annual Review of Literature, Research and Teaching,* 46, 249-274. DOI: 10.1177/007327530804600301.

3. Hájek M., Zimmermannová J., Helman K., Rozenský L. (2018). Analysis of carbon tax efficiency in energy industries of selected EU countries. *Energy Policy,* 134, 110955. DOI: https://doi.org/10.1016/j.enpol.2019.110955.
4. Joskow P.L. (2006). Markets for power in the United States: An interim assessment. *Energy Journal,* 27(1), 1-36. DOI: http://ez.el.fa.ru:2187/stable/23296974.
5. Kuo T.C., Hong I.H., Lin S.C. (2016). Do carbon taxes work? Analysis of government policies and enterprise strategies in equilibrium. *Journal of Cleaner Production*, 139, December 15, 337-346. DOI: https://doi.org/10.1016/j.jclepro.2016.07.164.
6. Levi S. (2021). Why hate carbon taxes? Machine learning evidence on the roles of personal responsibility, trust, revenue recycling, and other factors across 23 European countries. *Energy Research & Social Science*, 73, March. DOI: https://doi.org/10.1016/j.erss.2020.101883.
7. Malerba D., Gaentzsch A., Ward H. (2021). Mitigating poverty: The patterns of multiple carbon tax and recycling regimes for Peru. *Energy Policy*, 149, February, 111961. DOI: https://doi.org/10.1016/j.enpol.2020.11196.
8. Nnorom I.C., Osibanjo O. (2008). Overview of electronic waste (e-waste) management practices and legislations, and their poor applications in the developing countries. *Resources, Conservation and Recycling*, 52(6), 843-858. DOI: https://doi.org/10.1016/j.resconrec.2008.01.004.
9. Pindyck R.S. (2019). The social cost of carbon revisited. *Journal of Environmental Economics and Management*, 94, 140-160.
10. Ricke K., Drouet L., Caldeira K., Tavon M. (2018). Country-level social cost of carbon. *Nature Climate Change,* 8, 895-900. DOI: https://doi.org/10.1038/s41558-018-0282-y.
11. Shi Q., Ren H., Cai W., Gao J. (2019). How to set the proper level of carbon tax in the context of Chinese construction sector? A CGE analysis. *Journal of Cleaner Production,* 240, December 10, 117955. DOI: https://doi.org/10.1016/j.jclepro.2019.117955.
12. *State and trends of carbon pricing* (2019). Washington, DC, World Bank. URL: https://openknowledge.worldbank.org/handle/10986/31755 License: CC BY 3.0 IGO.
13. Stevens K.A., Carroll D.A. (2020). A comparison of different carbon taxes on utilization of natural gas. *Energy and Climate Change,* 1, December, 100005. DOI: https://doi.org/10.1016/j.egycc.2020.100005.
14. Wang M., Li Y., Li M., Shi W., Quan S. (2019). Will carbon tax affect the strategy and performance of low-carbon technology sharing between enterprises? *Journal of Cleaner Production*, 210, February 10, 724-737. DOI: https://doi.org/10.1016/j.jclepro.2018.10.321.
15. Wei S. (2021). A sequential game analysis on carbon tax policy choices in open economies: From the perspective of carbon emission responsibilities. *Journal of Cleaner Production*, 283, February 10, 124588. DOI: https://doi.org/10.1016/j.jclepro.2020.124588.
16. Yu P. (2020). Carbon tax/subsidy policy choice and its effects in the presence of interest groups. *Energy Policy*, 147, December, 111886. DOI: https://doi.org/10.1016/j.enpol.2020.111886.

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