

ICEST 2022**III International Conference on Economic and Social Trends for Sustainability of Modern Society****DEVELOPMENT OF TERRITORIES OF YENISEI SIBERIA
UNDER CONDITIONS OF ECONOMIC DECARBONIZATION**

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Abstract

The influence on the introduction of the European Union cross-border tax on products exported by the Russian Federation to the countries of the European interstate association, which contain a "carbon footprint" is investigated. The possibility of response by the Russian state to the imposition of the European Union cross-border tax is analyzed. The possibility of using forests to localize carbon dioxide emissions is investigated. Analyzes the experience of using various instruments of incentives for the development of certain sectors of the economy. The systematization of instruments of stimulation is carried out. The experience of using the best available technologies in the Russian Federation and the development of territories in the conditions of decarbonization of the economy is considered. It is proposed to use certain incentives based on foreign experience in the formation of production chains of technological development of mining and processing industry of Nizhny Priangarye on the basis of hydropower cluster.

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1. Introduction

The global economy is currently entering a fundamentally new phase of its development. It is being significantly influenced by the processes involving the decarbonization of industry and stricter sanctions on emissions of various greenhouse gases into the planet's atmosphere. The United Nations (UN) and the European Union (EU), an association of European states, have in fact spearheaded these processes. The most radical positions on the environment are taken by the EU.

It is within the European Union that quite significant and sometimes controversial environmental programs have been adopted over the past decades, which are either becoming or have already become ecological standards for other states. Such well-known EU programs in the field of environmental improvement as "The Hydrogen Strategy for a Climate-Neutral Europe", "The European Green Deal", "The EU Strategy for Energy System Integration" and a number of others belong to these kind of environmental standards. They set out the main objectives, tasks and implementation mechanisms. Their implementation is provided with the necessary resources, including financial ones.

Thus, according to the available plans, it is proposed to allocate more than five hundred billion euros annually for the implementation of environmental programs within the European Union. According to the EU representatives, this financial support will make Europe the cleanest part of the planet by the beginning of the 50's of this century, making the EU a kind of moral leader in the field of global ecology (Prokhorov, 2021; The European Green Deal Investment Plan and Just Transition Mechanism explained, 2020).

At the same time, one can observe that the struggle for ecological ideals sometimes goes beyond some allowable limits. For instance, in the European Union it has been proposed to introduce the so-called cross-border tax on products manufactured on the basis of "dirty" technologies which use carbon-containing materials and are exported into the territory of this interstate association. All of this allows to say that this cross-border tax could be one of the sources of funding of the European Union's environmental programs.

2. Problem Statement

The introduction cross-border tax could become a certain barrier to products from a number of developing countries. They are the ones who supply products with the so-called "carbon footprint" to Europe. The cross-border tax may in fact become a protective barrier, which in general will have a significant impact on the development of their national economies (The EU introduces a carbon tax. What is its essence and how it works: Environmental News+1, 2021).

A significant proportion of products exported from the Russian Federation may also be subject to the tax. This could include oil, natural gas, chemical products, metals, and other products which contain a "carbon footprint".

Experts from the European Union have already calculated that the release of products in the Russian Federation, exported to the EU, emissions of carbon dioxide into the atmosphere exceed one billion tons per year. And depending on how cross-border taxation will be applied in practice, the Russian economy could lose billions of euros annually. As a result, the money resources of the Russian Federation

will also be involved not in solving its own environmental problems, but in decarbonizing the EU economy (Belousov, 2021).

3. Research Questions

In the Russian Federation, the best available technologies are applied in the framework of the national project "Ecology" (NP "Ecology"). The NP "Ecology", along with other ten federal projects, includes a federal project "Implementation of the best available technologies". (FP "Implementation of the best available technologies"). The application of BAT within the framework of the FP "Introduction of the best available technologies" is allowed only to those, who are described in the "Information and Technical Guides" of the "Best Available Technologies".

In order to stimulate Russian enterprises to implement the best available technologies in their operations, a number of preferences have been proposed in the FP "Implementation of the best available technologies" and in a number of other regulations. Firstly, if an enterprise uses the issue of its corporate bonds to finance the implementation of the best available technologies, it can receive a subsidy when it pays interest rates within a certain price range. For example, when using imported technology and equipment, the amount of subsidy is 70% of the basic indicator. If domestic technologies and equipment are used, it is 90% of the basic indicator (Decree of the Government of the Russian Federation N 702, 2016; Passport of the national project "Ecology", 2022).

Secondly, it is possible to accelerate the depreciation of equipment used in an industrial enterprise when applying the BAT. In the first year, it is possible to accumulate depreciation charges of up to 50% of the original cost of the equipment, but a number of necessary conditions must be met. The useful life of the equipment must be more than 3 years. And the enterprise itself must not stop its operational activities for at least one year from the time the equipment is put into operation.

Thirdly, there is an opportunity to receive benefits for calculating fees for negative environmental impact. The benefit is to use a reduced coefficient, which is 0.5.

Fourthly, the industrial enterprise is given the opportunity to offset the negative impact fee. Offsetting is the investment made in the best available technology used. The offset amount is up to 100% of the investment made.

Fifthly, an industrial enterprise may not pay the required payments for negative impact on the environment. This condition is applied only after the introduction of the best available technologies at the enterprise (Prokhorov & Zelenskaya, 2020).

But despite the obvious preferences that an industrial enterprise would receive if it applied the best available technologies in its operations, during 2019-2021 not a single issue of corporate bonds was made in the Russian Federation. This has led to the fact that recently in the professional sphere the issue of the need for early termination of the implementation of the FP "Implementation of the best available technologies" has been discussed.

The analysis of the reasons of this state in the FP "Introduction of the best available technologies" allows to draw a number of conclusions about the reasons which led to a negative result. One of the reasons is that the "Best Available Techniques" information and technical guides do not correspond to the modern achievements of science and technology.

It should be stated that a significant part of the best available technologies has already lost some scientific validity. And BAT data no longer create stimulus for their introduction into industrial production. So, for example, there are no BATs in the "Information and technical guides of the "Best Available Technologies", including those on marker substances and their indicators, and waste incineration does not meet modern requirements. This situation did not arise by chance. This is largely due to the fact that the working groups which are to determine the best available technologies are mostly formed by specialists from the enterprises themselves, the industry where they are to be implemented. And these specialists in the working groups are in the majority. In this case, decisions on important issues related to the determining the best available technologies are approved by a simple majority. In contrast to the Russian Federation, the situation in the European Union is somewhat different - there these working groups do not include representatives of enterprises at all.

Another reason is competition from other Russian programs and projects. For example, under the federal project "Expanding access of small and medium-sized businesses to financial support, including concessional financing", one can get subsidized interest rates on corporate bonded loans up to 70% without being tied to certain technologies. In addition, there is the possibility of reimbursement of expenses for the preparation and placement of a bonded loan, the amount of which can be up to 2% of the volume of the issue, but not more than 1.5 million rubles. In addition, there is a possibility to reimburse the costs of preparing and placing the bond issue, which can be up to 2% of the issue, but not more than 1.5 million rubles. Russian development institutions can act as "anchor" investors when placing them (Passport of the federal project "Expansion of SMEs' access to financial support, including soft financing", 2018).

4. Purpose of the Study

It should be noted that the Russian Federation is also discussing its own plans to reduce greenhouse gas emissions, including the decarbonization of the Russian economy. Options for the implementation of such plans are being considered by the Government. According to various estimates this will require more than 90 trillion rubles by 2050. Based on current macroeconomic indicators, the Russian State would need expenditures comparable to three per cent of the country's aggregate GDP (gross domestic product) by 2050. In current conditions it will be an unaffordable amount for the country (Belousov, 2021; Decree of the Government of the Russian Federation N 2052-r, 2021).

At the same time, it should be taken into account that the Russian state has certain natural advantages in the ecological sphere. In particular, the territory of the Russian Federation is a kind of "lungs of the planet". Forests, marshes and tundra, which cover 80 per cent of the country's territory, are carbon dioxide absorbers. According to expert estimates, they are collectively capable of absorbing more than two billion tons of carbon dioxide (Ministry of Natural Resources and Environment estimates that Russia's forests absorb more than 1 billion tons of carbon dioxide, 2021).

The data of expert assessments are somewhat underestimated. For example, in such a woodland country as Finland, it was proved on experimental plots in the forest area that one hectare of forest is capable of absorbing up to 7 tons of carbon dioxide per year on average. In the Russian Federation, for various reasons, this proven figure is no more than 400 kilograms per year (Duel, 2021).

But despite the understated level of data on carbon dioxide absorption by Russian forests, it can be argued that domestic nature currently allows carbon dioxide emissions to be absorbed not only at home, but also on a global scale. At the same time, the forests themselves and wastes from their processing (they account for up to 50% of forest processing) are valuable raw materials for a significant number of industries in the Russian economy, including the timber chemistry industry, the furniture industry, the production of synthetic fibers, paper and cardboard, etc. At the same time, the most promising sector in the country's forestry complex is the timber-chemical industry. It is the basis for the production of such end products as artificial threads and fabrics, artificial fur, fodder yeast, wood boards, cardboard and paper products, biofuels, etc. (Prokhorov & Zelenskaya, 2020).

5. Research Methods

In this regard, it should be said that the most significant reserves of timber and other important raw material resources are located in the northern territories of the Russian Federation. One of such regions is the Krasnoyarsk Territory, which is a part of such informal macro-regional association as Yenisei Siberia (uniting the Krasnoyarsk Territory, the Republic of Khakassia and the Tyva Republic). At the same time, the most promising northern territories in the Krasnoyarsk Krai is the Nizhny Priangarye (Federal Law N 7-FZ, 2002).

In Nizhny Priangarye, the energy component in the form of the existing Boguchanskaya HPS and the planned building of the Nizhneboguchanskaya HPS can create a certain point of economic growth not only in the region, but also in the Yenisei Siberia in the whole. It is in this area that the formation of production chains of technological development of the mining and processing industry (Boguchansk industrial hub) based on the hydropower cluster should be initiated (Rozhnov et al., 2022).

Here one has to take into account the fact that the activities of the extractive and processing industries may cause some ecological damage to the nature of the region. But this harm can be localized, using environmental technologies based on modern scientific achievements in the field of environmental protection. They are known and described in special normative documents, which are called "Information and Technical Guides "Best Available Technologies". These normative documents are approved by Rosstandart. At present, their total number reaches 50.

In general, the concept of the best available technologies (BAT) was first introduced in the European Union. Directive 96/61/EC "On Integrated Pollution Prevention and Control" of 24 September 1996 described this concept and the spheres of its application.

The EU directive defined a list of industrial activities which were recognized as hazardous from the environmental point of view. These activities included, among others: energy industries; chemical industry; metal production and processing; mineral processing; pulp and paper production, tanning of leather raw materials, management of all types of waste; primary processing and dyeing of fibers (fabrics), etc. These are the sectors which should have been paid attention to and in which the environmental situation should have been improved. It was proposed to use, as one of such mechanisms, new environmentally friendly modern best available technologies.

The proposed mechanism has proved to be successful. And it has begun to be implemented in the European Union. In the Russian Federation, the concept of BAT was developed in the Federal Law "On

Environmental Protection". In turn, the practical use of the best available technologies was proposed in the Resolution of the Government of the Russian Federation of 23 December 2014 No 1458. The Russian BAT list is identical to the EU list of the best available technologies (Federal Law N 7-FZ, 2002).

6. Findings

The unsuccessful experience of implementing the FP "Introduction of the best available technologies" makes to think about the application of other incentive tools in the implementation of both environmental projects and large projects for the spatial development of various territories. And in this regard, such a project as the development of the Lower Angara region on the basis of a hydropower cluster is an interesting object for the application of incentive tools, including state support measures for the formation of production chains for the technological development of the mining and processing industries.

On the basis of the analysis of the experience of a number of states in the implementation of environmental projects and the development of certain territories, several groups of incentive tools based on state support were identified, which can be used depending on the goals and objectives set. All of them, to one degree or another, can be used for the development of the Lower Angara region on the basis of a hydropower cluster to form production chains for the technological development of the mining and processing industries there.

The first group should include incentive instruments based on tax instruments. The possibility of exemption or a significant reduction in the payment of value added tax in the implementation of environmental projects acts as such tools. In a number of countries, it is possible to apply accelerated depreciation of equipment for renewable energy sources (renewable sources of electricity). In addition, in the EU, citizens are reimbursed part of the income tax on the income they received from investments in renewable energy (Avramchikova et al., 2021; Working paper, 2021).

The next group includes incentive instruments, which are based on various mechanisms of state subsidies. They make it possible to recover costs arising from the generation of electricity from renewable sources, including subsidizing the income paid on bonded loans and bank loans. Subsidizing is also used for reimbursement of costs arising from the justification and development of projects in the sphere of ecology, etc.

The third group should include incentive instruments based on government regulation of tariffs. For example, in the United States and in the European Union, the state regulates tariffs in a number of sectors of the economy, including energy, transport and some other segments of the economy. Thus, the EU, through the regulation of transport tariffs, redistributes the transportation of goods from air and road transport to rail and water transport. This makes it possible to reduce carbon dioxide emissions into the atmosphere, what improves the ecological situation in the European Union (Avramchikova et al., 2021; Working paper, 2021).

The fourth group includes incentive instruments which use state quotas for carbon dioxide emissions, which industrial enterprises and generating companies are obliged to fulfill in the electricity market. This mechanism is used in the EU in various modifications.

For companies, generating electricity, quotas are provided for the mandatory production of a certain amount of electricity using renewable energy sources. Thus, in the EU it is established that by 2025 in electricity generating companies, the volume of electricity using renewable energy in the total volume of its production should not fall below 12.1%. If the generating company does not fulfill the conditions then it pays a fine or acquires "green" certificates, what allows to pay off the negative environmental effect which has arisen.

The "green" certificates themselves are issued by government structures and are provided as a premium bonus to generating companies when generating electricity based on RES. One such certificate has the equivalent of several hundred kilograms of carbon dioxide released into the atmosphere of the planet.

The turnover of "green" certificates occurs when the generating company has a surplus of them, what causes an increase in their sales. The market for "green" certificates is quite active in the European Union. At the same time, the state actively stimulates it by increasing quotas for generating companies in the production of electricity with renewable energy sources application. All this in general stimulates the production of electrical energy based on renewable energy sources (Avramchikova et al., 2021; Working paper, 2021).

European industrial enterprises are also responsible for the quality of ecological processes. For them, also, quotas for greenhouse gas emissions have been used by the state for decades. There, too, if a company exceeds its emission quotas, it must either purchase an additional emission allowance from the state for a certain amount of greenhouse gas or pay a hefty fine. All this makes the enterprise to use new environmental technologies, including those which are in the list of the best available technologies. Their application leads to the fact that a number of the most technologically advanced enterprises have unused quotas, what results in their circulation on the market. Market purchase and sale of these quotas is carried out on a specialized trading platform called "The European Emissions Trading System" (EETS). It has been operating in the European Union since 2005.

It should be noted here that the state uses quotas for greenhouse gas emissions in the same way as the mechanism for stimulating certain sectors of the economy. In particular, it can provide free of charge these quotas to industrial enterprises in the development of which the state is interested. This is actually an instrument of state support of a number of sectors of the economy (Working paper, 2021).

Another group of incentive instruments is the use of "green" financing in the implementation of ecological projects. "Green" financing is used by the state to accumulate funds of legal entities and individuals by issuing special bonded loans on its own behalf for the subsequent investment of the funds received in ecological projects, including those implemented by private businesses.

The sixth group of incentive instruments includes the application of mechanisms based on state co-financing of projects in the field of ecology. The co-financing itself is carried out through certain development institutions. They issue, as a rule, various interest-free loans, including for the purchase of technological equipment. The state in a number of countries quite often provides its own guarantees for private businesses to obtain ecological loans in commercial banks. The grant policy is actively used when the state issues grants for the development and justification of various projects in the field of ecology (Avramchikova et al., 2021; Passport of the federal project "Expansion of ...", 2018).

7. Conclusion

The development of the Lower Angara region on the basis of the hydropower cluster involves the application of various incentive tools. Some of them, after some adaptation, can also be applied in the Lower Angara region.

When forming production chains for the technological development of the mining and processing industries in the Lower Angara region on the basis of a hydropower cluster in compliance with mandatory and necessary environmental requirements, it is possible to use the following groups of incentive tools based on state support.

The first group can include tax incentives. They can be based not only on the reduction of rates for a number of taxes or the abolition of payments on them. But it is possible to subsidize their payment, both from the regional and federal budgets. It also makes sense to use tax investment crediting.

The second group of incentive instruments in the Lower Angara region for the production chains of the technological development of the mining and processing industries can include the application of co-financing instruments for research and development work on industrial projects which improve the ecological sphere. It is possible to use new subsidizing mechanisms, including interest rates on credits and loans, on pre-investment costs, etc. The issuance of state guarantees for targeted lending in banks, when financing project activities, etc. is also applicable. Grant support should be used when conducting research and development work on projects in the Lower Angara region.

The next group of incentive instruments can be based on the application of a flexible tariff policy. Its scope should be extended to the regulation of energy and transport tariffs. When regulating energy tariffs, it is necessary to take into account the fact that the Lower Angara region has its own energy base, represented by the operating Boguchanskaya HPS. It is also planned to build the Nizhneboguchanskaya HPS. This circumstance should cause a reduction of energy tariffs in this zone. Particular attention should be paid to the regulation of transport tariffs. Transport tariffs for the export of finished products from the Lower Angara region over long distances should ensure its cost competitiveness.

The fourth group of incentive instruments should include mechanisms based on state and municipal purchases of finished products produced by the enterprises of the Lower Angara region. Guaranteed sales of products of industrial enterprises in this area will give a stimulus for the perspective development of enterprises.

In general, the formation of production chains of technological development of the mining and processing industry in the Lower Angara region on the basis of the hydropower cluster, using various incentive instruments, will make it possible to effectively address not only the development of the northern territories of Krasnoyarsk Territory, but also to localize ecological problems. All this will generally give a certain impetus to the economic development of a macro-region such as Yenisei Siberia.

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Production Chains in the Technological Development of the Hydropower Cluster of Yenisei Siberia (Boguchansky Industrial Hub)".

References

- Avramchikova, N., Rozhnov, I., Zelenskaya, T., Maslova, O., & Avramchikov, V. (2021). Circular economy and "green technologies". *E3S Web of Conferences*, 291, 02014. <https://doi.org/10.1051/e3sconf/202129102014>
- Belousov, A. (2021). Mankind has not yet come up with any other answer to climate change. On Russia's general approaches to the process of decarbonization of the economy. *Kommersant*. <https://www.kommersant.ru/doc/5038967>
- Decree of the Government of the Russian Federation N 2052-r dated October 29. (2021). *Strategy of socio-economic development of the Russian Federation with low greenhouse gas emissions until 2050*. <http://static.government.ru/media/files/ADKkCzp3fWO32e2yA0BhtIpyzWfHaiUa.pdf>
- Decree of the Government of the Russian Federation N 702 dated July 20. (2016). *On the application of basic indicators in calculating the parameters of subsidizing the interest rate from the federal budget on loans, bonded loans and (or) leasing contracts depending on the terms of lending, as well as determining the limit level of the final lending rate, above which the interest rate is not subsidized*. <http://government.ru/docs/all/107763>
- Duel, A. (2021). The carbon footprint goes with the forest. How much does it cost for trees to absorb one ton of CO₂? *Rossiyskaya Gazeta*, 93. <https://rg.ru/2021/04/27/eksperty-podschitali-sebestoimost-pogloshcheniia-lesom-ugleroda.html>
- Federal Law N 7-FZ dated January 10. (2002). "On the protection of the environment". http://www.consultant.ru/document/cons_doc_LAW_34823
- Ministry of Natural Resources and Environment estimates that Russia's forests absorb more than 1 billion tons of carbon dioxide. (2021). *TASS news agency*. <https://www.tass.ru/ekonomika/11337647>
- Passport of the federal project "Expansion of SMEs' access to financial support, including soft financing". (2018). <https://economy.samregion.ru/upload/iblock/b9c/Rasshirenie-dostupa-subektov-MSP.pdf>
- Passport of the national project "Ecology". (2022). https://www.economy.gov.ru/material/file/fbad8a780cfe43d0d4e807eb166ae5fb/NP_EKO_241218.pdf
- Prokhorov, V. V. (2021). *Risks of the Russian State in Conditions of World Economy Decarbonization. Actual Problems of Humanities and Natural Sciences*. Kazan: Publishing house "Print-service XXI century", 236-239.
- Prokhorov, V. V., & Zelenskaya, T. V. (2020). Formation of an industry cluster based on public-private partnership mechanisms. Reshetnev Siberian State University.
- Rozhnov, I., Anikina, Y., & Zelenskaya, T. (2022). Logistics for Supply and Production of Equipment for the Nizhneboguchanskaya HPP Construction. *Transportation Research Procedia*, 61, 376-383. <https://doi.org/10.1016/j.trpro.2022.01.061>
- The EU introduces a carbon tax. What is its essence and how it works: Environmental News+1. (2021). <https://finance.rambler.ru/economics/46827367-es-vvodit-uglerodnyy-nalog-v-chem-ego-sut-i-kak-on-rabotaet-novosti-ekologii-1-15-07-2021>
- The European Green Deal Investment Plan and Just Transition Mechanism explained. (2020). https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24
- Working paper. (2021). *Establishment of the green bond market in Russia, taking into account international best practices. The results of the survey of members of the Russian Council for the Primary Capital Market*. <https://new.nfa.ru/upload/iblock/0af/0afb9635754162eebb058f7a87200449.pdf>