

Assessment of Threats to Environmental Security and Climate Change

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Abstract. Climate change is one of the biggest geopolitical challenges facing states and peoples in the 21st century. It can be said without exaggeration that climate change is a multiplier of conflicts associated with the growth of socio-political instability and global stratification of societies, increased migration pressure, more frequent large-scale natural disasters in the form of forest fires and floods, causing serious social consequences, etc. global warming is still not entirely clear even to specialists, but the consequences seem to be very threatening to the very existence of the entire human civilization. Under the influence of global warming, the concepts of carbon neutrality and energy transition have emerged and become widespread.

1 Introduction

In recent decades, the climate on Earth has changed markedly: some countries suffer from abnormal heat, others from too harsh and snowy winters, unusual for these places. All these are manifestations of the ongoing global climate change, which brings an increase in the average annual temperature, causing the melting of glaciers and an increase in the level of the World Ocean. In addition to warming, there is also an imbalance in all natural systems, which leads to a change in precipitation patterns, temperature anomalies and an increase in the frequency of extreme events such as hurricanes, floods and droughts [1]. The events of recent years - anomalous and long hot and dry periods – “heat waves”, cold snaps in warm seasons - the so-called “cold waves”, prolonged rainy seasons leading to floods and floods, confirm this. Catastrophic floods in the Irkutsk region and the gigantic spread of forest fires in Siberia and the Far East in 2019 are also associated with changes in the climate system [2]. The consequences of global climate change can be catastrophic. An increase in the level of the World Ocean by 0.5–1.0 m as a result of intensive melting of polar ice can cause flooding of coastal densely populated areas. A further increase in the number and

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intensity of extreme climate events is expected [3]. The pattern of precipitation will change, the number of abnormally hot and humid years will increase, hurricanes, storms, tsunamis, floods and droughts will occur more often and with greater intensity. Climate change is caused by both natural and anthropogenic factors. Natural external influences include fluctuations in the Earth's orbital parameters, volcanic activity and solar activity, the influence of cosmic rays, the Earth's internal heat, the planet's magnetic field, etc. But, no matter how strong the natural external and internal variations of the climate system were, they could not lead to such an increase in temperature that has been observed in the last 40 years [4]. This is an unequivocal conclusion of the works of scientists and experts, as well as national scientific reports, in particular, from Russia and the USA, in which the water and carbon cycles, flows of water vapor, CO₂, methane and other substances that affect the Earth's climate system are analyzed in detail. Anthropogenic impacts include changes in the gas and aerosol composition of the atmosphere as a result of human activities (burning of coal, gas and oil products, industrial production, agriculture, etc.), as well as changes in the nature of land use (deforestation, drainage of swamps, urban growth, etc.). P.). The greenhouse effect has been studied in detail. It has been proven that carbon dioxide (CO₂) is responsible for 60% of its strengthening. The main danger is the burning of fossil fuels, which causes a constant increase in the concentration of CO₂ in the atmosphere. Over the past two centuries, the concentration of CO₂ in the atmosphere has increased by almost a third %.

2 Research Methodology

Environmental protection as one of the priority areas of activity of the European Union received modern development in the European Green Deal presented by the European Commission in December 2019 [7]. Along with the EU countries, the goal of achieving climate neutrality by 2050 was set, in particular, by the United Kingdom, Japan, South Korea, and by 2060 China [5]. This course should reduce the anthropogenic impact on the planet through a sharp reduction in greenhouse gas emissions, a transition to a circular economy, an increase in the use of renewable energy sources (RES) and measures to preserve biodiversity. An important component of the Green Deal is the EU's actions on the world stage. The European Union intends to assert its leadership in the fight against rising temperatures on Earth through its own example, as well as through regulatory pressure. First of all, the so-called border corrective carbon mechanism - CBAM (Carbon Border Adjustment Mechanism) is intended to become such [6]. The European Union remains Russia's main trading partner. In 2021, it accounted for 36% of Russia's foreign trade turnover, 38.3% of Russian exports and 32% of imports [5]. Therefore, regulatory changes in the European Union will directly affect Russia. At the Eastern Economic Forum 2021, German Gref outlined six risks of climate policy and energy transition for Russia: falling export earnings; reduction in employment, especially in export industries; aggravation of the situation in single-industry towns; loss of Russia's leadership in the global energy sector; decrease in revenues to the Russian budget; problems of energy companies up to their potential bankruptcy [2]. According to various estimates, in general, for the Russian economy, exports in the amount of 0.7 trillion rubles will fall under the CBAM. (5.7% of exports to Europe and 2.4% of Russian exports as a whole). CBAM should be launched from January 1, 2023, but no payments will be collected from importers until 2025 inclusive. So far, only information will be collected on the volume of greenhouse gas emissions from the production of imported products. From January 1, 2026, numerous additional requirements should begin to apply, including the purchase of CBAM certificates [8]. The mechanism under consideration will regulate direct emissions of three greenhouse gases: carbon dioxide, nitrogen oxide and perfluorocarbons.

The CBAM will cover the power industry, the production of iron and steel, aluminum, cement and fertilizers. It is very likely that the list of goods covered by this tax will expand over time. In particular, the CBAM mechanism can be extended to Russian exports of oil products, as well as to indirect CO₂ emissions from the production of products (for example, emissions from the generation of electricity used in industry). The European Commission has presented MCAS as a mechanism that will serve as an important element of the EU's toolkit to achieve climate neutrality by 2050 by eliminating the risk of carbon leakage. The draft EU Regulation on MCWA provides for the complete exclusion of certain countries and territories and, accordingly, their products from the scope of this mechanism. In particular, exceptions are already provided for Iceland, Liechtenstein, Norway and Switzerland, as well as a number of territories (Busingen, Helgoland, Livigno, Ceuta, Melilla). For Iceland, Liechtenstein and Norway, exceptions are linked to their participation in the EU Emissions Trading Scheme (EU ETS), and for Switzerland, to a bilateral agreement with the EU connecting their greenhouse gas trading systems.

3 Results and Discussions

The discovery of the greenhouse effect and the first statements that greenhouse gases affect the increase in temperature in the atmosphere date back to the 19th century - even then scientists first started talking about the role of human activity in this process. By the 1990s, the anthropogenic factor was recognized as the leading one in terms of climate change [9]. The history of international climate agreements began in 1992 with the United Nations Framework Convention on Climate Change (UNFCCC), adopted at the Earth Summit in Rio de Janeiro. The document entered into force on March 21, 1994, followed by several years of negotiations - they concerned the obligations of countries that ratified the convention. Currently, 196 countries and the European Union are parties to the convention. In 1997, the so-called Kyoto Protocol was adopted, which defined these obligations, in particular with regard to the reduction of greenhouse gas emissions. This agreement, which entered into force in 2005, fixed the principle of differentiated responsibility of states (obligations to reduce emissions were imposed only on developed countries and countries with economies in transition) and established emission quotas, while flexible mechanisms for their application were provided (one of such mechanisms is — trading in quotas) [10]. The next most important step was the adoption in 2015 in Paris of an agreement fixing specific goals to keep global temperatures within certain limits, as well as imposing specific obligations on all participating countries to reduce their own CO₂ emissions. For example, Russia has committed itself to reducing its emissions by 25-30% by 2030 compared to 1990 levels, taking into account the absorptive capacity of forests.

Since 1995, the UN has held annual sessions of the Conference of the Parties to the Framework Convention (Conference of the Parties, abbreviated as COP), at which changing circumstances, details and obligations under existing agreements are discussed. The meeting in Glasgow, postponed for a year due to the pandemic, is the 26th in a row. The importance of this event is evidenced by the number of participants: more than 25,000 people from 200 countries, including more than 120 delegates - heads of state and government [11]. The traditional topics of climate meetings are ways to move away from fossil fuels, reducing the share of gasoline and diesel vehicles, green energy, carbon neutrality, which many participants plan to achieve by 2050-2060. But the climate agenda is not only about moving away from fossil fuels in favor of clean ones and a “race to zero”, as national plans to achieve carbon neutrality are often called. We are also talking about environmental programs that are necessary to protect the seas and forests. One of the actively discussed problems is human agricultural activity, which leads to deforestation, soil depletion, pollution of water bodies, and is also one of the significant anthropogenic

factors of climate change. The transition to sustainable agriculture is one of the topics discussed by COP26 participants [12]. Also on the agenda of all climate summits is assistance to countries and population groups most vulnerable to climate change. The Paris Agreement records a pledge by developed countries to mobilize at least \$100 billion annually to help developing countries suffering from the effects of climate change.

The climate summit in Paris in 2015 was a historic event: for the first time, the countries that signed the UN Framework Convention on Climate Change agreed to join forces. Specific targets were set, including “keeping global temperatures well below 2°C (3.6°F) above pre-industrial levels while finding means to limit growth to 1.5°C.” Also at the summit in Paris, countries committed themselves to preparing national plans to reduce emissions [13]. The agreement contains the obligations of the parties to update the national plans and report about it every five years. The five-year cycle ended last year. Thus, on the eve of the current climate summit, the participants had to provide information on new intentions to reduce CO₂ emissions. According to the UN, more than 80 countries have updated their national plans - less than half of all participants, but all members of the G7 have done so. It is already obvious that the plans adopted by the participating countries are clearly not enough to achieve the goals set by the Paris Agreement: the climate continues to change at a faster pace than previously thought. The current decade is seen as crucial to slowing the pace of global warming. Therefore, all participating countries were asked to adopt stricter targets for reducing emissions in their countries by 2030 and achieving zero emissions by mid-century.

Not only the postponement of the annual conference due to the COVID-19 pandemic made it especially anticipated. One of the reasons why this year’s climate conference in Glasgow received so much attention was the actions of the United States. In 2017, the United States withdrew from the Paris Agreement at the initiative of Donald Trump, who believed that his state had excessive and unprofitable obligations. Joe Biden immediately after the inauguration signed a decree on the return of the United States to the Paris Agreement - this process was completed in February 2021. Thus, one of the world’s largest emitters of CO₂ has returned to the climate arena [14]. Developing countries were also full of expectations - to increase compensation from rich countries, citing the restoration of historical justice: warming is caused by carbon dioxide that has been accumulating in the atmosphere since the beginning of the industrial revolution in the countries of the first world, and developing economies should not pay for it. The passivity of the parties to the Paris Agreement and the lack of intention to take on increased commitments in terms of reducing CO₂ emissions were the reason why UN Secretary General António Guterres called the previous climate summit in Madrid a failure. Over the past 2 years, experts and many politicians have become more certain that the time allotted for the implementation of plans to achieve carbon neutrality and other climate goals is very short. As Alok Sharma, Chairman of COP26, said ahead of the conference: “We can’t suddenly wake up in 2029 and decide to cut emissions by 50% by 2030.” Therefore, it was expected from the summit that political declarations would be translated into practice, and the leaders of the states would begin to agree on how to narrow the gap between what needs to be done to prevent a climate catastrophe and what they are really ready to do [15]. The global trend towards increasing the share of low-carbon and renewable energy sources includes steps to develop hydrogen energy. Hydrogen is now regarded as a universal clean energy carrier capable of solving the problems associated with generation instability that arise when using renewable energy sources. The use of hydrogen will make it possible to decarbonize energy, transport and industry, that is, to significantly reduce the use of oil and coal, the main sources of greenhouse gas emissions. To do this, however, the hydrogen itself must be produced by methods with a low carbon footprint, but today the vast majority of it is produced from fossil sources without capturing carbon dioxide. The problem is that, due to the high cost,

low-carbon hydrogen production is still unprofitable for most countries, despite the high interest in green technologies. Leading players in the global hydrogen market are already developing and improving low-carbon technologies along the entire production chain. However, it will take not only time, but also political efforts to develop reliable and commercially attractive models based on pilot and demonstration projects. The development of hydrogen energy is one of the priorities of the Energy Strategy of the Russian Federation until 2035. Rosatom State Corporation plays a significant role in the implementation of this strategy. The nuclear industry of our country has the necessary scientific and technological potential for the development of the main low-carbon methods of hydrogen production - electrolysis production and steam reforming of methane using CO₂ capture technologies - and is actively involved in several large hydrogen projects.

The OECD plays an active role in studying and responding to climate change. Along with supporting international climate negotiations over the years, the OECD has stepped up its efforts to help countries meet their national and international climate commitments and contributions. The work of the OECD focuses on the environmental, economic, financial and social dimensions that are critical to creating low-emission, climate-resilient development paths [14]. In his fourth biennial lecture on climate change, OECD Secretary-General Angel Gurría focused on how countries can overcome the many political, economic and social barriers to achieve the rapid reductions in greenhouse gas emissions needed to secure our common future. The OECD report *Climate Change Mitigation through a Well-being Lens*, released in July 2019, aims to encourage and support government efforts to achieve their national and international climate change mitigation goals. It notes that a mitigation-based approach is likely to be more politically, economically and socially feasible to implement, and more effective when there is bilateral alignment between climate change mitigation actions and broader climate change goals. human welfare and sustainable development. Applying the concept of well-being to climate change mitigation is a way for governments to achieve this bilateral goal. The concepts of sustainable development and green growth have become important in international development.

In addition, Russia will keep carbon emissions at the same level for 35 years. The consequences, and very significant ones, for Russia will be not so much the ratification of the agreement, but the global transition to low-carbon development, which was supported by most of the countries that have already acceded to the agreement, including our key partners in the west and east [16]. This transition leaves less room for fossil fuels (coal, oil, natural gas) and other carbon-intensive products that are the backbone of the Russian economy and Russian exports. And in the future (and not too distant) there may not be any place on the market for these resources at all. In the Strategy for Economic Security of Russia until 2030 (approved by Decree of the President of the Russian Federation dated May 13, 2017 No. 208), changes in the structure of global demand for energy resources, the structure of their consumption, the development of energy-saving and “green” technologies are mentioned among the main challenges and threats to economic security. Meanwhile, these global trends are largely determined by actions aimed at mitigating climate change and reducing greenhouse gas emissions [15]. Appropriate policies and measures create a most favorable environment for the development and use of green, low-carbon technologies, fuels and energy sources, while making it unprofitable and even unethical to use traditional technologies and energy resources that are perceived as inappropriate in the modern context.

4 Conclusions

The modern scientific theory of global climate change has been developing for several decades. To date, it has been established that an increase in the average temperature of the

Earth's surface (an increase of 0.8°C since the middle of the 20th century) is accompanied by the melting of glaciers, a rise in the level of the world ocean, and the oxidation and heating of sea water. Over the past one and a half thousand years, mankind has not yet known such an increase in the temperature of the Earth's surface, which is observed today. The established reason for these processes is an increase in the greenhouse effect due to an increase in the concentration of CO₂ in the atmosphere due to human activities (primarily the use of fossil fuels in the energy sector). This causal relationship is the subject of consensus among climate scientists around the world (including Russia). Global climate change already today leads to a variety of physical, socio-economic and humanitarian consequences. Insurance companies record a steady increase in the number of natural disasters and adverse events - floods, hurricanes, heat waves, hail, droughts, wildfires.

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