Chapter 13
Role and Importance of Modern Technologies in Combating Global Climate Change: Legal Aspect

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Abstract This Chapter argues in favor of the conclusion that climate change is of an objective nature and consists in the growth of average annual temperatures registered for several decades in many countries, including Russia. Undoubtedly, the causes of this phenomenon are complex; however, the growth of anthropogenic impact on nature, which manifests itself in the increase in greenhouse gas emissions, makes its contribution to the development of the dynamics of this process. This led to the development of international cooperation in mitigating the impact on climate and the elaboration of measures for the adaptation to climate change that has already occurred. To resolve these issues the 1992 United Nations Framework Convention on Climate Change was adopted as well as two international instruments developing and supplementing its provisions—the Kyoto Protocol and the Paris Climate Agreement. These international instruments stipulate a list of measures that must be taken by the countries joining these treaties, which will reduce anthropogenic impact on nature and slow the growth of average annual temperatures. Each country adopted a

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number of regulatory technical measures to fulfill the assumed international obligations, and Russia is not an exception in this case. Meanwhile, despite the adoption of a range of bylaws dedicated to the specific questions of fulfilling the assumed obligations, there is no systematic approach to the issue of climate protection at the level of federal laws in Russia, which requires correction (for example, through the supplementation of the Federal Law "On Environmental Protection" of January 7, 2002 with a special chapter). In this Chapter, it is also noted that some universal issues in the area of counteraction to global climate change are still relevant, they are typical for all countries and are to be resolved, in particular, the issue of climate refugees, compensation for harm caused by climate change and some other issues.

13.1 Materials

The regulatory framework of the study consists of instruments of international and national law. Among international treaties covering the main issues of counteraction to global climate change, the provisions of the 1992 UN Framework Convention on Climate Change, the 1997 Kyoto Protocol thereto, the 2015 Paris Climate Agreement as well as numerous Russian bylaws regulating Russia's fulfillment of the assumed international obligations were used in the Chapter. The latter include the following bylaws which are of the most interest: Decree of the Government of the Russian Federation of September 15, 2011 "On Measures to Implement Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" (with the Provision on the Implementation of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change), the Executive Order of the Government of the Russian Federation of December 25, 2019 "On the Approval of the National Action Plan of the First Stage of Climate Change Adaptation until 2022", the Directive of the President of the Russian Federation of December 17, 2009 "On the Climate Doctrine of the Russian Federation" and a number of other bylaws.

Works by Russian and foreign scholars dedicated to certain aspects of climate protection were used in the course of the study, in particular, the works by Brinchuk [2], Grinin [9], Druzin [6], Zolotova [24], Ivanova [11], Jaffe [12], Knox [13], Matveeva [14], Ovchinsky [16], Parker-Flynn [17], Sokolova [19, 20], and Falileev [8]. The works by the said authors made it possible to make a number of conclusions and suggestions aimed at the development of the legal support of technical measures for further climate protection (in the context of Russia).

13.2 Methods

A number of general scientific methods, in particular, formal logical, dialectical, systemic structural methods, and the method of critical cognition, were used in the

course of the study. Synthesis, classification, and generalization techniques were applied in the interpretation of the results of the study. Specific scientific methods were used in this Chapter as well: formal legal method, the principle of legal process assessment, the method of comparative analysis and so forth.

13.3 Introduction

According to instrumental data on global surface temperature, the last three decades have been the warmest since the middle of the nineteenth century. The average global surface temperature of the first decade of the twenty-first century was 0.5 °C higher than in the period from 1961 to 1990 and 0.2 °C higher than in the period from 1990 to 2000. In its turn, the last decade of the twentieth century was warmer than the previous decades. Regional climate anomalies are also associated with the occurring global changes. In the territory of the Russian Federation, the warming is much more intense than for the Earth on the whole. In recent decades, the rate of warming in the territory of Russia on the whole has been more than twice the global rate, and more than four times in some regions such as the Arctic Zone of the Russian Federation. In addition, there is large territorial and seasonal heterogeneity of the temperature changes.

Against the background of climate warming, many regions of Russia experience the growing frequency and intensity of dangerous hydrometeorological phenomena, including floods, forest fires, squalls, whirlwinds, hurricanes, cloudbursts with thunderstorms, hail and squally wind, heat waves, severe droughts, etc. An important peculiarity of climate change and its effects in Russia is that they began significantly affect many economic industries—the power industry, agriculture and forestry, transport, construction, environmental protection, housing, and utilities. Threats to human health increase, especially because of atmospheric pollution. Moreover, the frequency and intensity of these threats in Russia have a very clear tendency to increase [18].

The said tendencies are reflected in a number of program policy documents adopted in the Russian Federation. For example, in the Climate Doctrine of the Russian Federation [5], it is stated that climate change is one of the most important international problems of the twenty-first century, which goes beyond scientific discussions, it is a complex interdisciplinary issue covering environmental, economic, and social aspects of sustainable development of the Russian Federation. The unprecedentedly high rate of global warming observed in recent decades is of particular concern to the Russian authorities. Modern science provides increasingly convincing evidence that human economic activity, associated primarily with greenhouse gas emissions, has a significant impact on the climate as a result of fossil fuel burning. In their turn, the authors of the Environmental Security Strategy of the Russian Federation until 2025 approved by Decree of the President of the Russian Federation No. 176 of April 19, 2017 draw attention to the fact that on average about 950 dangerous hydrometeorological phenomena (floods, drought, strong wind, heavy

precipitation, etc.) causing significant damage to economic industries and the life of the population are registered in the territory of the Russian Federation every year. According to expert estimates, the material damage from dangerous hydrometeorological phenomena can reach one percent of the gross domestic product in certain years [21].

Hence it follows that state authorities of the Russian Federation attach great importance to the issue of global climate change, which cannot be solved on the scale and with the resources of a single country. This results in the increasing participation of Russia in the international cooperation in coping with global climate change and sets the objective at the national level to elaborate effective measures mitigating the effects of climate change or ensuring adaptation to them. The effects of climate change become a constant factor affecting the development of modern society; they are a big challenge for it. The development and adoption of the United Nations Framework Convention on Climate Change and two protocols to it (the Kyoto Protocol, which expired, and the 2015 Paris Climate Agreement) were an international response to this challenge [1], [22]. These instruments are aimed at decreasing the growth of global surface temperature by reducing greenhouse gas emissions.

Meanwhile, despite Russia's active participation in the international cooperation and development of a number of bylaws aimed at fulfilling the assumed international obligations, the climate is not an object of protection from the perspective of environmental legislation of the Russian Federation. Measures organized for its protection are not systematic. Undoubtedly, the development of a legal mechanism to combat global climate change (with the introduction of amendments to environmental, financial, administrative, and other legislation) is only an external reflection of solutions to this strategic task requiring new knowledge, scientifically grounded proposals and recommendations of representatives of various natural, technical, and other sciences. The development of an affective mechanism to combat climate change can be implemented only in case of a set of interdisciplinary, basic, exploratory, and applied research in the study of climate change, climate engineering, assessment of socio-economic and environmental losses and damage as well as potential benefits from occurring and expected climate change. In this regard, the purpose of this Chapter is to make a contribution to the settlement of this complex issue from the perspective of legal science.

13.3.1 International Cooperation in Combating Global Climate Change: Legal Aspect

The development of international climate cooperation has passed several stages associated with the gradual awareness of the depth of the problem of climate change by the most part of the international community.

(1) The starting point of international climate cooperation is the adoption of the United Nations Framework Convention on Climate Change of May 9, 1992

[23]. According to Article 2 of this Convention, its ultimate objective is "to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner". To achieve the said objectives, the convention stipulates a very wide list of obligations which must be assumed by the states that have signed this document and the protocols to it.

(2) The Kyoto Protocol to the 1992 Framework Convention on Climate Change. The main provisions of the Kyoto Protocol included the following areas of activity: determination of the permissible volume of greenhouse gas emissions from 2008 to 2012 for all industrially developed countries that signed the document; development of the mechanism for the correction of quotas for certain countries (international trade in quotas, implementation of joint projects for the introduction of technologies ensuring emission reduction); development of the mechanisms of control over the levels of emissions (the need to create national anthropogenic emission assessment systems, monitoring of emissions and discharges). The Protocol stipulated a system of quotas for greenhouse gas emissions. The essence of this system consisted in the fact that every country was allowed to emit a particular amount of greenhouse gases. In addition, it was supposed that some countries or companies would exceed the quota of emissions. In such cases these countries or companies could buy the right to additional emissions from the countries or companies the emissions of which were less than the assigned quota [14].

It appears that the significance of the Kyoto Protocol is that, on the one hand, it was intended to create legal conditions to ensure the limitation and reduction of greenhouse gas emissions into the atmosphere, consequently, the main purpose of the adoption of the Kyoto Protocol is to reduce the anthropogenic load on one of the components of the environment—the air. On the other hand, the said document contained legal regulations due to which "the international market mechanism of the settlement of global environmental issues began to form". First of all, legal conditions for the trade in quotas for greenhouse gas emissions into the air were created, which predetermines the considerable economic interest of states in the reduction of greenhouse gas emissions [24].

(3) The Climate Change Conference (Copenhagen, December 7–19, 2009). It was held like "the last stand" to resolve issues related to the formation of the climate regime after 2012. This expected importance was reflected in the fact that the Conference was held at a higher level than usually. The result of the Copenhagen Conference was a political agreement, in particular, the Copenhagen Accord. It was not adopted by all the governments but raised a number of key issues [20].

(4) The modern stage of international cooperation in combating climate change begins with the 2015 Paris Climate Agreement [1]. This Agreement involves the following steps: holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C, recognizing that this would significantly reduce the risks and impacts of climate change; increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development.

Meanwhile, despite the importance of this Agreement, it does not stipulate any specific sanctions or other consequences for the countries that fail to fulfill their obligations. This leads to a conclusion that this kind of consensus is extremely fragile. Even if only a few countries withdraw from the Agreement, this can have negative consequences, serving as an example for other countries, which can also cease performing their obligations.

One of the possible solutions to increase confidence between the countries participating in the 2015 Paris Agreement is to create a system of deposits within the framework of a special international fund for common property management: the parties to the Agreement will make an advance deposit to this special international fund understanding that all or part of their contribution will be canceled if they do not fulfill their obligations to reduce greenhouse gas emissions. In addition, we should note that the purpose of this scheme is not to eliminate specific cases of non-fulfillment of obligations, it is rather to stimulate an adequate degree of the initial confidence of countries in mutual promises, which can prevent breaches of the Paris Agreement [6].

Therefore, the need to promote international interaction in the area of combating global climate change is explained by the lack of a direct relationship between the place of greenhouse gas emissions and climate change [19]. To settle this issue, the international community has adopted a number of international documents, the most important of which at the present stage of climate cooperation is the 2015 Paris Climate Agreement. The slowdown of the increase in the average annual temperature, the reduction of greenhouse gas emissions and the preservation of human civilization in its current form depend on the implementation of its provisions. The search for guarantees for the implementation of the provisions of the Paris Agreement is still relevant at the moment, and the main issue is the creation of conditions for mutual confidence among the parties to the Agreement.

13.3.2 Development of National Legislation in the Area of Counteraction to Global Climate Change: Trends and Prospects

Two strategies for overcoming the effects of global climate change are considered commonly recognized in international science: mitigation and adaptation. Mitigation can be defined as anthropogenic intervention aimed at reducing the sources or emissions of greenhouse gases. On the contrary, adaptation is a regulator of natural and human systems in response to actual or expected climate change or its effects which mitigate the harm or provide new beneficial possibilities. Measures to mitigate the effects of climate change are often preventive and focus on the sources of climate change, while adaptation is created as a measure to respond to the effects of the already changed climate [17].

It appears that the climate response, both to anthropogenic impact and to measures to mitigate it, is characterized by its delay in relation to this impact. Within the framework of the national climate policy, this peculiarity predetermines an important role of timely adaptation to the climate change which is inevitable in the coming decades. At the moment, the main objectives of the Russian climate policy are to strengthen and develop the information and scientific basis for decision-making in the field of climate (in particular, to improve the scientific, technical, and technological potential of the Russian Federation), to elaborate and implement prompt and long-term measures to adapt to climate change and measures to mitigate anthropogenic impact on the climate, to ensure Russia's participation in initiatives of the international community in addressing questions associated with climate change and related issues. Adaptation to climate change is necessary for Russia to reduce losses and use the benefits associated with the observed and future climate change. Measures for the adaptation to climate change are stipulated by resolutions of Russian public authorities with consideration of international arrangements. The planning, organization, and implementation of measures for the adaptation to climate change, including anticipatory adaptation, are organized with consideration of industrial, regional, and local specific features as well as the long-term nature of these measures, their scope and depth of impact on various areas of the social life, economy, and state.

The following estimates are essential components in the development and planning of measures for the adaptation to climate change: vulnerability to the adverse effects of climate change and the risks of related losses; possibility to gain benefits associated with the favorable effects of climate change; cost-effectiveness, efficiency (including economic efficiency) and practical feasibility of the corresponding adaptation measures; adaptation potential with consideration of economic, social and other factors for the state, economic sectors, population and individual social groups.

To mitigate the effects of climate change, state authorities of Russia must focus a maximum of their efforts on the reduction of anthropogenic greenhouse gas emissions and the increase in their absorption by sinks and reservoirs. Measures are also required to improve energy efficiency in all economic sectors, develop the use of renewable and alternative energy sources, decrease market distortions, implement financial and

fiscal policy measures that stimulate the reduction of anthropogenic greenhouse gas emissions, protect and enhance the quality of greenhouse gas sinks and reservoirs, including rational forestry, afforestation and reforestation on a sustainable basis.

Like any complex phenomenon, climate change within a particular country can have not only negative but also certain positive effects. For example, with respect to the Russian Federation, the negative effects of the expected climate change are as follows: increased health risks (higher morbidity and mortality) for some social groups of the population, increased frequency, intensity and duration of droughts in some regions, extreme precipitation, floods, overwatering of soil dangerous for agriculture in other regions, increased fire danger in woodlands, degradation of permafrost in the northern regions damaging buildings and communications, disruption of the ecological balance, displacement of some biological species by other ones, spread of infectious and parasitic diseases, increased energy costs for air conditioning in the summer season for a significant part of settlements. In turn, the possible positive effects of the expected climate change with which the significant potential of effective economic development is associated include reduction of energy consumption during the heating period, improvement of ice conditions and, accordingly, conditions for cargo transportation in the Arctic seas, easier access to the Arctic shelves and their development, improvement of the structure and expansion of crop production area as well as increase of the efficiency of animal husbandry (subject to compliance with a number of additional conditions and adoption of particular measures), increase of boreal forest productivity [5].

Despite certain theoretically possible effects of global climate change, there are obviously more negative effects, which required the adoption of the necessary measures at the level of national legislation. This work for the reduction of greenhouse gas emissions started in Russia when the Kyoto Protocol was still in effect.

Already then, it determined the procedure for the selection, approval, and monitoring of the progress of projects implemented in accordance with Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change as well as receipt, transfer, and acquisition of greenhouse gas emission reduction units.

The bylaws adopted by the Government of the Russian Federation [4] stipulate that the projects implemented in accordance with Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change are approved by the Ministry of Economic Development of the Russian Federation, and the limit of carbon units for the selection and approval of projects implemented in accordance with Article 6 of the Kyoto Protocol is 300 million units.

Afterward, when the Paris Climate Agreement had been already adopted, Russia provided for several stages of climate change adaptation. In particular, the first stage of adaptation planning involved the determination of a set of organizational, regulatory legal, methodical, informational, and scientific support of the implementation of the national plan for global climate change adaptation in Russia [7]. Accordingly, the Government of the Russian Federation was instructed to ensure greenhouse gas emission reduction up to 70% of the 1990 level by 2030 with consideration of the maximum absorption capacity of forests and other ecosystems and subject to sustainable and well-balanced socio-economic development of the Russian Federation, to

develop the Strategy for Socio-Economic Development of the Russian Federation with low greenhouse gas emissions until 2050 with consideration of peculiar features of the economic industries as well as to ensure the creation of conditions for the implementation of measures to reduce and prevent greenhouse gas emissions and to increase their absorption [3].

Therefore, from the above review it follows that the issue of climate change has been at the center of attention of state authorities in the Russian Federation in recent years. A number of important political and legal acts have been adopted. They determine a long-term strategy of the state policy in ensuring climate change mitigation and adaptation. Some bylaws set a list of specific measures and obligations to be achieved in Russia as a result of actions of the authorities.

13.3.3 Current Issues of Legal Protection of Climate: Articulation of the Issue and Possible Solutions

Despite the international cooperation expanding every year as well as measures adopted at the level of individual states (including Russia), a number of issues in the field of climate protection and elimination of the consequences of greenhouse gas emissions are universal and they are still to be solved.

(1) Climate change and the resulting floods, droughts, and other emergencies inevitably cause harm to the life, health, and property of citizens. In Russia, there are still no claims for compensation for harm caused by climate change. However, this law enforcement practice has been already established in the United States. For example, in 2005, a tribe of Inuit living in the Arctic filed a petition with the Inter-American Commission on Human Rights (IACHR) that accused the United States of violating its human rights obligations. The petition detailed the effects of rising Arctic temperatures on the ability of the Inuit to enjoy a wide variety of human rights, including the rights to life (melting ice and permafrost make travel more dangerous), property (as permafrost melts, houses collapse and residents are forced to leave their traditional homes), and health (nutrition worsens as the animals on which they depend for sustenance decline in number). The petition connected the rising temperatures to increasing levels of greenhouse gases, and in particular to the failure by the United States to take effective steps to reduce its emissions [13]. The plaintiffs in Comer v. Murphy Oil USA filed suit against energy production companies, alleging that the defendants' greenhouse gas emissions contributed to climate change and the intensity of Hurricane Katrina. The plaintiffs sought monetary damages for property loss caused by Hurricane Katrina. In Connecticut v. American Electric Power, the plaintiffs filed suit against electric power corporations, claiming that the defendants' greenhouse gas emissions were contributing to climate change, and claiming that climate change harmed and continues to harm the plaintiffs' residences and property. The plaintiffs sought an injunction, which

would place a cap on the defendants' greenhouse gas emissions. However, all the mentioned cases were dismissed [12]. This review of the judicial practice of the United States can be continued; however, the main conclusion of its study is that rejecting compensation for harm caused by climate change, the courts considered that the causal connection between emissions of the particular companies and the climate disasters the plaintiffs had suffered was unproven. Therefore, the development of the theory of evidence in "climate cases" is the most promising and unsettled doctrinal legal issue.

(2) If the provisions of the 2015 Paris Climate Agreement are not implemented in the near future, global warming will become the main reason for the extinction of wild animals [11]. Climate change already has a significant influence on nature. The first signs of the impact of climate warming on fauna were found by scholars in many countries long ago. Despite the recognition of the hazard of these phenomena and the taken actions, the volumes of emissions continue growing and threaten the preservation of biodiversity, the normal functioning of the agricultural industry, the interests of the territorial integrity of individual countries, and the exercise of human rights [2]. Climate change is too fast, this is why many species of wild animals do not have time to adapt to it.

(3) By now, global climate change has caused the emergence of a new legal phenomenon—environmental migration, which results not from warfare or political persecution but from change in the human habitat. These changes can be due to droughts or floods caused by deterioration of the environment and climate change or by the increase in the level of the World Ocean as a consequence of melting ice, which entails the flooding of recently habitable islands [10]. The emergence of "climate migrants" requires a change in the available approaches and the development of a new international legal category; moreover, it is obvious that climate migration is a special case of environmental migration—a category that is not sufficiently developed in international law either [15].

(4) The occurring climate change causes a number of consequences which are not obvious; consequently, they are little discussed by experts and representatives of the political community. First, according to recent studies by criminologists, climate change and rising temperatures lead also to an increase in crimes (and not necessarily only because people have less access to drinking water) [16]. Second, there are scientific studies showing the interrelationship between the political system (authoritarian or democratic) and the climate (hot or cold) [8, 9]. Though all the conclusions made by these scholars require check and further research, they cannot be denied, which is indicative of the multi-faceted nature of the climate issue.

(5) There is now no mention of climate as an object of environmental relations in Russian environmental legislation (including the main environmental Federal Law "On Environmental Protection" of January 7, 2002). This means there is no consistency in the understanding of the issue of climate protection at the level of legislative acts. Undoubtedly, references to specific practical measures to mitigate or adapt to the effects of climate change in bylaws are important for

the fulfillment of the international obligations assumed by Russia; however, in order to increase the efficiency of statutory regulation of climate protection issues, it is necessary to supplement the above mentioned environmental law of the Russian Federation with a special chapter containing a list of state regulation measures, including a list of restrictive measures in certain areas of human activity (transport, construction, etc.) for the reduction of impact on climate.

With consideration of the fact that the principles of law are the core of the legal system (and each particular branch of law), determining not only its current condition but also performing the predictive function of the development of the relevant branch, it appears reasonable to supplement Article 3 of the Federal Law "On Environmental Protection" with a new environmental principle of "legal protection of climate", which now is still purely doctrinal.

13.4 Conclusion

The conducted study leads to a conclusion that climate change is of an objective nature and consists in the growth of average annual temperatures registered for several decades in many countries, including Russia. Undoubtedly, the causes of this phenomenon are complex; however, the growth of anthropogenic impact on nature, which manifests itself in the increase in greenhouse gas emissions, makes its contribution to the development of the dynamics of this process. This caused the development of international cooperation in mitigating the impact on climate and the elaboration of measures for the adaptation to climate change that has already occurred. To resolve these issues the 1992 United Nations Framework Convention on Climate Change was adopted as well as two international instruments developing and supplementing its provisions—the Kyoto Protocol and the Paris Climate Agreement. These international instruments stipulate a list of measures that must be taken by the countries joining these treaties, which will reduce anthropogenic impact on nature and slow the growth of average annual temperatures.

Each country adopted its own measures to fulfill these international obligations, and Russia is not an exception in this case. However, despite Russia's adoption of a range of bylaws dedicated to the specific questions of fulfilling the assumed international obligations, there is no systematic approach to the issue of climate protection at the level of federal laws, which requires correction. Some universal issues in the area of climate protection are still relevant; they are typical for all countries and are to be resolved, including the issues of climate refugees, compensation for harm caused by climate change and some other issues.

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