

GREENHOUSE GAS MANAGEMENT AND RELATED ECONOMIC ACTIVITIES

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Abstract

In this article, the author talks about a global change in society - warming. It is based on the adverse effects of climate change – health risks, flooding, fires, land degradation. The reason for all these climate changes is the increase in the concentration of greenhouse gases. Combating climate change, greenhouse gas emissions - achieving carbon neutrality or decarbonization.

Keywords: global warming, greenhouse gases, carbon neutrality, emission reduction, Paris Agreement

I. Introduction

The pandemic did not bring relief to the environment: in 2020, despite the slowdown in economic processes, the temperature of the planet continued to rise, glaciers continued to melt, and the level of carbon dioxide in the atmosphere reached a maximum in 3 million years. This was reported to the World Meteorological Organization at the UN.

It is clear that global warming and the consequences of these changes have adverse effects and increasingly affect the country's socio-economic institutions, infrastructure and human health.

Under these conditions, there is a need to develop a system for adapting to global climate change, reducing losses and gaining benefits associated with monitoring the environment and subsequent climate change.

In recent years, the population and the economy of the country have been exposed to the greatest danger as a result of earthquakes, floods, severe storms, fires, chemical disasters, radioactive materials, environmental and man-made disasters. Strategic changes are needed.

Among the predicted negative consequences of climate change for Russia are: increased risk to human health; the frequency of growth, the intensity and duration of droughts, heavy rainfall, flooding and watering of soils dangerous for agriculture, the increase in forest fires, the disorganization of the natural balance, as well as the consumption of large amounts of energy resources and changes in ecological diversity.

If we take into account the positive results expected for Russia in connection with climate change, we can single out: the deconstruction of energy resources during the heating season; improving the ice situation, which means improving the conditions for transporting goods to the Arctic, the presence of the Russian continental shelf in the Arctic Ocean; increasing the fertility of forest resources in the northeast; increase in productivity in cattle breeding.

The warmest year in Russia was 2020. On average, the temperature in our country is rising faster than in other parts of the world. In addition, we are increasingly seeing dramatic climate changes in our cities: unusual heat in the Urals, heavy rains, thunderstorms and floods in the Krasnodar Territory, fires in Yakutia. People are forced to migrate to other areas due to the deterioration of the urban environment.

Dramatic climate change is caused by rising concentrations of greenhouse gases in the global atmosphere, such as atmospheric carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). It is mainly caused by human activities. Atmospheric isotopes confirm that the burning of fossil fuels plays an important role in increasing the concentration of CO₂ in the atmosphere.

The oil and gas sector, often caused by pollution of the planet, produces only 12% of all anthropogenic sources of gas emissions (direct emissions from production and emissions from energy companies) - less than in the agricultural sector (13%), energy, transport and industry [1].

Fossil fuels needed for energy production are the main source of greenhouse gases. According to the World Resources Institute, 76% of carbon dioxide concentration goes to the energy sector. This term covers both products important for industry and domestic needs (30.4%), as well as fuel assessment in transport (15.9%), in industrial production (12.4%), in construction and construction services (5, 5%) and other industries (Fig. 1) [2].

The Russian Institute of Climate and Global Ecology has calculated that in the Russian Federation this share is even slightly higher - 78.7%. The National Anthropogenic Emissions Inventory states that half (55.9%) of emissions come directly from electricity generation for cities, homes, offices and industries.

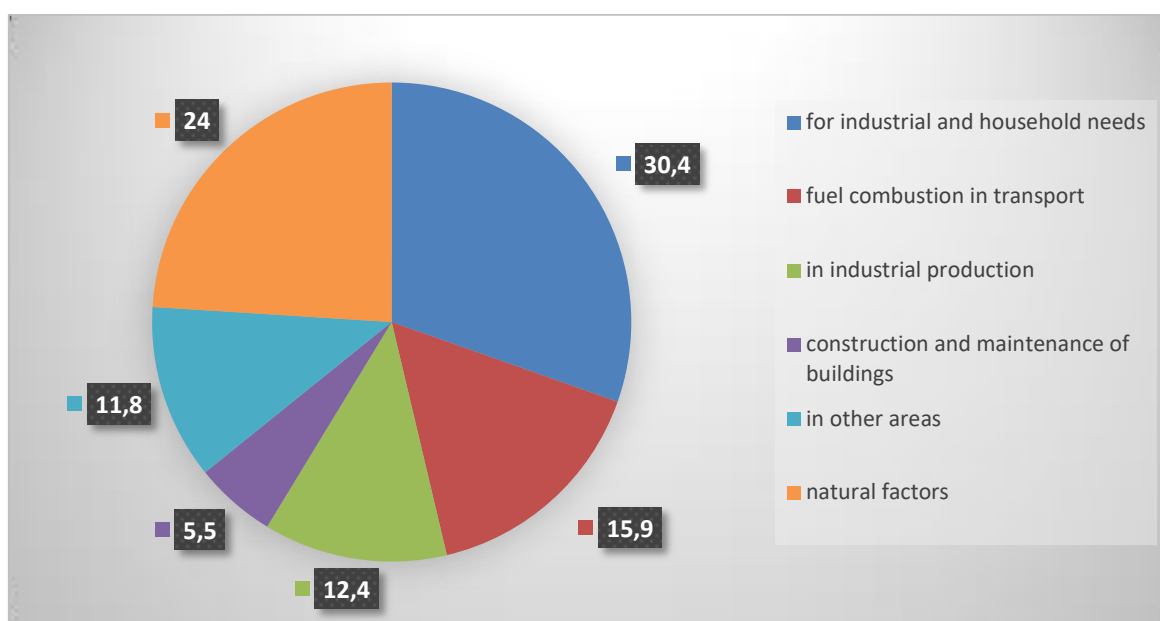


Figure 1: Emission of carbon dioxide from human activities

II. Methods

The fight against climate change has gone so far that Europe, which has decided to become decarbonized by 2050, has prepared a surcharge on foreign manufacturers that used products with high greenhouse gas emissions in their production.

The main way to decoupling an enterprise (reducing emissions) is to increase the share of renewable energy sources in consumption.

According to the Agora Energiewende Institute's Ember analytical center, in 2020, for the first time in history, the share of renewable energy sources in electricity generation in Europe exceeded the share of energy resources - 38% compared to 37%, respectively [3].

Companies from different countries are literally "competing" to present the largest project that will reduce greenhouse gas emissions.

Thus, the metallurgical giant ArcelorMittal has begun developing a technology for the production of low-carbon steel. Its competitors from ThyssenKrupp and RWE presented a solution

for the production of iron on hydrogen.

Airlines like Lufthansa are developing new jet fuels, diamond miners are working on carbon capture technology using recycled kimberlite, cement manufacturers are coming up with new formulations of “carbon neutral” cement and mineral additives.

The lion's share of domestic external supplies falls on fuel and energy products. According to the Federal Customs Service, in 2020 their share in total exports amounted to 49.6%. At the same time, the EU accounted for 38.5% of Russian commercial turnover (41.6% in 2019). It is Russia's largest trading partner.

Most importers have long been preparing to work under the new rules. For example, back in China, in November 2016, a Program was developed and approved that provides for the reduction of greenhouse gas emissions per unit of GDP. China has launched pilot projects on CO₂ trade [4].

In developed countries, all sectors of the economy can be decarbonized by 2050, in developing countries - by 2060, according to the report of the International Commission on Energy Transition. CO₂ emissions must be reduced by 55%, for this it is necessary to reduce the consumption of fossil fuels by an average of 42% [5].

The Paris Agreement signed by 192 countries under the UN Framework Convention on Climate Change in 2015 became the basis for creating the current measures to regulate carbon emissions. This is a continuation of the Kyoto Protocol of 1992 [6]. The purpose of this agreement is to limit the growth of average temperatures on the planet to 1.50°C (Fig. 2). To do this, all signatory countries must take steps to reduce emissions of water vapor, methane, ozone, in particular CO₂. The authors and signatories of these documents proceed from the fact that it is this process that causes global warming, which is dangerous for the existence of all mankind.

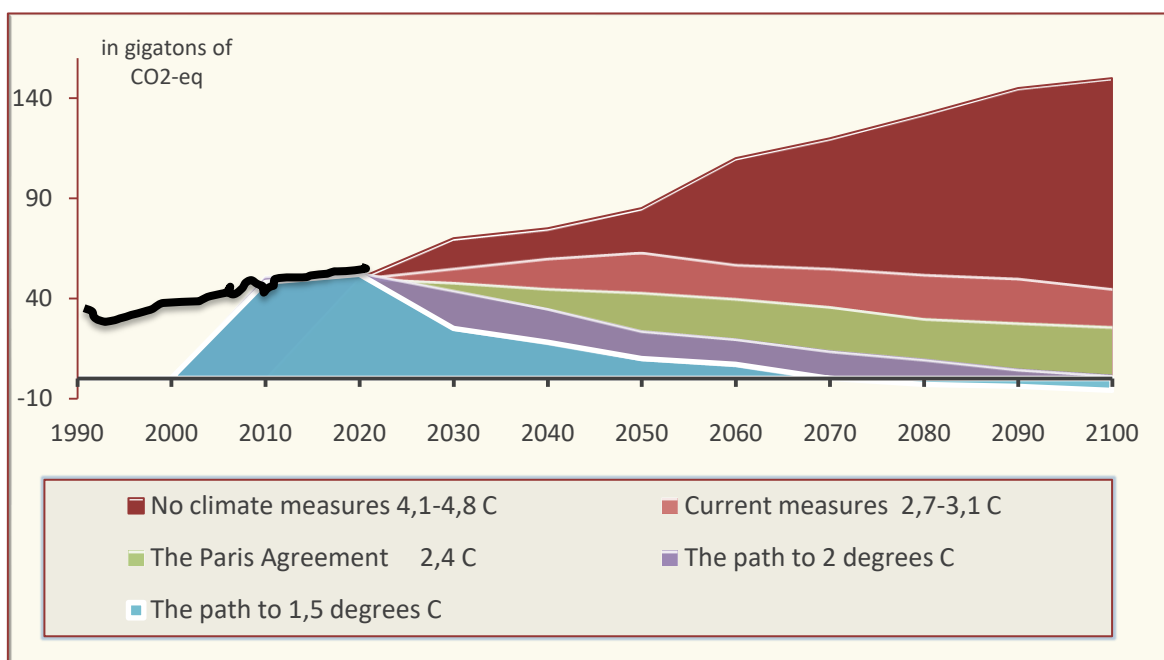


Figure 2: Global greenhouse gas emissions and warming scenarios

In Russia, in order to fulfill the obligations related to the regulation of greenhouse gas emissions and preparations for the ratification of the Paris Agreement, the Decree of the Government of the Russian Federation of November 3, 2016 N 2344-r developed an Implementation Plan. A number of measures were approved to improve the state regulation of greenhouse gas emissions. [7].

III. Results

In order to resolve long-term controversies and provide scientifically motivated information on the balance of man-made and natural flows of carbon dioxide, ozone gases in the Russian Federation, the President of Russia in the register of instructions for the implementation of the Address to the Federal Assembly in 2021 regulated "the creation of a national system for high-precision monitoring and utilization of climate-active gases."

Such an ultra-precise greenhouse gas analysis scheme must be based on the relationship of three factors: satellite monitoring systems, ground-based monitoring, and mathematical modeling using these data. Note that to implement a representative soil structure analysis of greenhouse gas fluxes, a network of several thousand small test plots in different types of ecosystems is needed to evaluate regular changes in CO₂ stocks (Fig. 3). In terms of satellite analysis of greenhouse gas flows, of course, it should be based on the development of strategic directions of the domestic space segment and maintaining the digital sovereignty of our country.

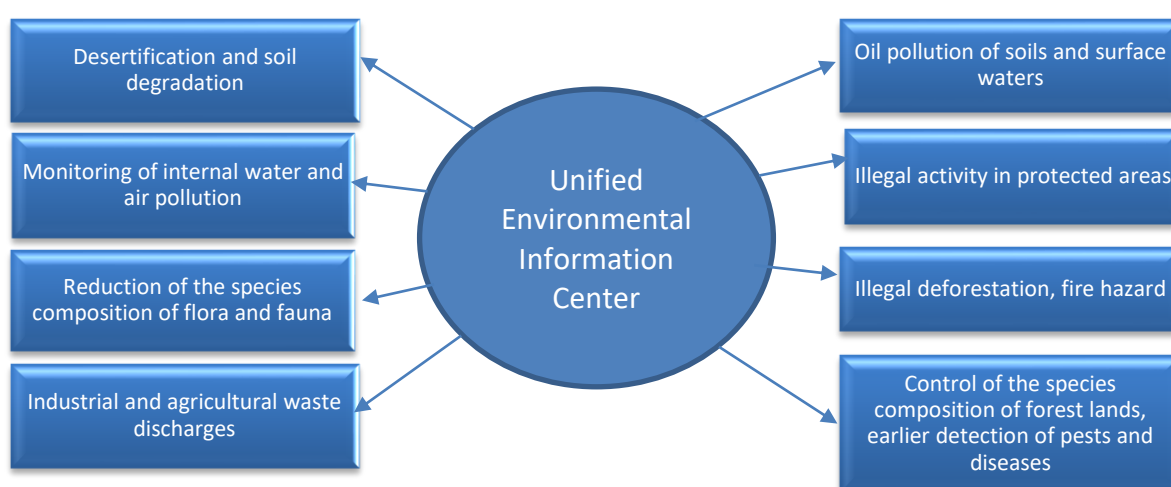


Figure 3: *Methods for controlling CO₂ emissions*

In Russia, a system of carbon landfills will be introduced to develop a method for measuring sequestration and emissions of carbon and other greenhouse gases (methane, nitrous oxide). In order for the system to take into account the geographical features of the climate and soil, seven pilot regions were selected: the Kaliningrad, Sakhalin, Novosibirsk, Tyumen regions, the Chechen Republic and the Krasnodar Territory. In addition, these sites will be engaged in the reproduction of plant varieties with a high ability to absorb greenhouse gases.

Russia cannot deny climate ratification: this may create risks for the sustainable development of the national economy after 2040.

The Ministry of Economic Development has prepared a strategy for the long-term development of Russia with low greenhouse gas emissions until 2050.

The Ministry of Development offers the following scenarios for the development of climate regulation: basic, intensive, inertial, and a scenario without state support measures (Fig. 4). So far, the agency recommends adopting a baseline scenario with an emphasis on sustainable use of forests and energy conservation. Such a scenario may be logical until around 2030, but then many countries are likely to move towards forced reductions in greenhouse gas emissions, putting pressure on Russia as well.

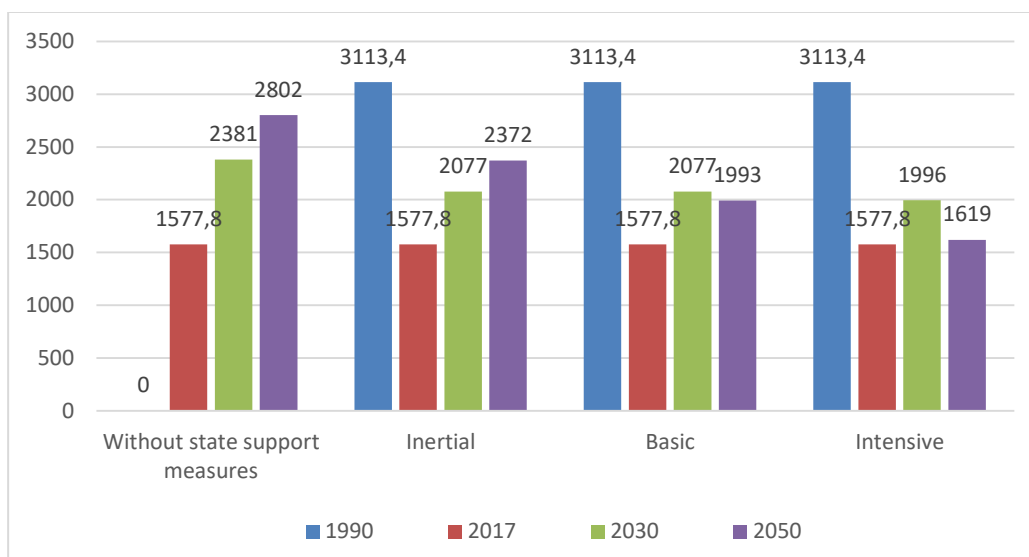


Figure 4: Increase in greenhouse gas emissions under various scenarios for the development of climate regulation in the Russian Federation

In the baseline scenario, by 2050 the Russian Federation will reduce greenhouse gas emissions by 36% to 2 billion tons of CO₂ equivalent. At the same time, the cumulative reduction in emissions will be 80-81 billion tons, i.e., approximately 8% of the global carbon budget (an acceptable amount of carbon dioxide that enters the atmosphere without causing a temperature increase of more than 2 degrees).

In this scenario, the Ministry of Economic Development proposes the following measures:

- Massive introduction of energy-saving technologies in the power industry, industry, buildings and transport in order to reduce the loss of energy resources.
- Increasing waste recycling, regeneration of large landfills and the use of methane.
- Promotes the production and use of products with high energy efficiency.
- Strengthen the protection of forest areas from fires, pests, reduce deforestation, include cultivated forests on abandoned agricultural lands in the state register, etc. [3].

In the intensive scenario, Russia will reduce emissions by 36% by 2030 and by 48% by 2050, to 1.6 billion tons of CO₂. By 2100, hydrocarbon neutrality will reach zero net greenhouse gas emissions. At the same time, RA will make the most significant contribution to limiting the increase in global temperature to 1.5°C, and the cumulative reduction in emissions will be 90 billion tons of CO₂ equivalent by 2050.

Additional measures are implemented in the intensive scenario [3]:

- Tax and collection taxes.
- Establish a national labeling system for high-carbon products and disclose information to consumers about the origin of electrical energy.
- Create incentives for buildings to be equipped with solar panels, photo panels, etc.
- Expansion of producers' responsibility, introduction of payment for disposal, reclassification of part of the waste into secondary raw materials.
- Prohibition of clear-cutting.

When preparing the climate strategy, the Ministry of Economy of the Russian Federation takes into account macro-indicators of long-term forecasts for the development of Russia's socio-economic activity for 2036. It includes the price of Russian oil Ural at the level of \$57.6 per barrel in 2019-2024, by 2036 it should be at the level of \$55.5 per barrel [8].

IV. Discussion

Changes in the global climate have already created new dangers and problems for many countries and regions, and in the future, the negative consequences of such changes could be truly tragic. Despite the ongoing scientific and research disputes on the causes and factors of global warming, the world community has taken an unambiguous point of view - it is necessary to take decisive measures to reduce anthropogenic emissions and increase greenhouse gas emissions into the atmosphere.

It is obvious that the solution of the global problem can only be achieved through the joint efforts of all countries of the world. But each country has its own national interests, sometimes contradicting the interests of other countries. And yet, global threats should unite people to find compromise solutions acceptable to all. It was not easy to reach consensus by signing the UN Framework Convention on Climate Change, which for the first time provided for economic mechanisms for cooperation within the framework of the goals of the UNFCCC.

However, one political declaration is not enough to participate in the mechanisms of the Kyoto Protocol. It also requires political desire, a strategy for controlling greenhouse gas emissions, information support for emissions and emissions of sinks, legislative and institutional support for activities to reduce greenhouse gas emissions, mechanisms for integrating into the global carbon market, etc. All this is possible and does not require significant costs, which is confirmed by the calculations of the Ministry of Economy of the Russian Federation.

If the company is involved in operations on the international market, it is necessary to prepare for international and Russian requirements. Why is it necessary to determine the amount of greenhouse emissions. If the mass exceeds 150 thousand tons per year, then it will need to be reported already in 2022. If the mass of emissions is 50,000 tons per year or more - after 2024. Company reports will be checked, a register and analytical data will be provided [9].

Russia is a country with a rich natural resource potential, we have a large share of mining enterprises and primary processing enterprises. And this is a serious challenge for Russian companies, and not only for large companies, but also for small and medium enterprises.

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