

Climate Adaptation of Transport in the Eurasian Economic Union



Elena A. Barmina , Aleksandr L. Nosov , Vladimir N. Volnenko ,
Evgeny R. Ismagilov , and Suj Bjao

Abstract The paper analyzes the consequences of climate influence on the transport complex in the EAEU and the Russian Federation. The authors determined the composition of the transport complex in relation to multidirectional climatic threats. The authors formed packages for adapting the institutional environment of the transport system and put forward technical proposals for climate adaptation of transport, using the example of the internal space of the Russian Federation, considering the inclusion of logistics flows to the EAEU countries. It is noted that the joint implementation of the proposed activities will effectively resist negative climate changes.

Keywords Transport · Climate change · Transport security · Proposals for adaptation · Institutional environment · Technical level

JEL Classification F15 · N7 · N70 · O19

1 Introduction

Transport is one of the most climate-dependent sectors of the economy. At the beginning of 2022, numerous problems related to climate and its impact on global transport logistics have aggravated worldwide. Simultaneously, ongoing events indicate the suspension of the development of national transport climate adaptation projects due to the COVID-19 pandemic and the diversion of major resources to combat it [1].

E. A. Barmina (✉)
Vyatka State University, Kirov, Russia
e-mail: ea_barmina@vyatsu.ru

A. L. Nosov
Vyatka State Agrotechnological University, Kirov, Russia

V. N. Volnenko · E. R. Ismagilov · S. Bjao
Belgorod State University, Belgorod, Russia

A literature review regarding applied instruments of technical regulation determined the following. In 2013, a group of experts from the United Nations Economic Commission for Europe produced a 270-page report “Climate change impacts for international transport networks and adaptation to them”. The countries of Europe, America, and Japan were analyzed for the negative impact of climate change on transport systems. This report did not include Russia. Over the next decade, global climate threats have increased significantly [2].

In 2020, the Climate Center of Rosgydromet presented the results of research and development in the field of scientific and methodological substantiation of sectoral and regional adaptation strategies to current and expected climate changes [3]. The report notes the dynamics of the increase in the average temperature in Russia and the growing number of dangerous phenomena that cause physical and economic damage. Deformation of rail tracks, negative phenomena in port infrastructure, damage to pipeline systems, etc. are noted in the field of transport destruction of road surfaces.

Due to the critical importance of the topic, in February 2020, the Inland Transport Committee of the Economic Commission for Europe mandated the Expert Group established in 2019 to analyze information and facilitate the implementation of assessment of projects on climate change impact on transport operations and infrastructure [4]. The Chair of the Expert Group is to present the final report at the session scheduled for September 2025. Participation in the work of the Expert Group is open to all interested members of the United Nations and experts.

The costs of preventing the consequences of climate change are currently estimated at 1% of the world GDP [5]. For example, considering the need of transport in 2010–2030, costs of infrastructure development in the EU are estimated at more than 1.5 trillion euros, adaptation costs of vulnerable bridges have been estimated as \$140–\$250 billion through the twenty-first century [6]. Together, sustainable development of transport and logistics systems is possible through production management, quality management [7–9], and the introduction of new technologies. For example, infrastructure provision and organization of production based on the Internet of Things can serve as a tool that determines adaptation mechanisms to climate change [10–13].

2 Materials and Method

Research methods within the framework of the EAEU and the Russian Federation include the monitoring of identified threats and projects to counter negative climate change in the transport infrastructure.

The mechanisms of adaptation to the consequences of climate change in the field of transport management were analyzed. According to certain critical impact factors presented by the United Nations Economic Commission for Europe, adaptation mechanisms within the EAEU and the Russian Federation include monitoring of identified threats and development of projects to counter negative climate change in the transport infrastructure [1].

The Federal law “On transport security” (No. 16-FZ) adopted in Russia characterizes transport infrastructure facilities and vehicles in detail. However, it is limited to their protection from acts of unlawful interference and leaves human-made phenomena caused by climate impact without consideration [2, 14].

At the end of 2021, 79% of countries initiated adaptation planning mechanisms at the national level (7% more than in 2020), which implies a single mechanism for systematizing problems and solutions, starting from the level of strategic planning, development of policy and related laws and projects, implemented at the level of powers and their administrative units [15].

As for the Russian Federation, aspects of adaptation mechanisms to climate change are defined by the national action plan of the first stage for the period up to 2022. They contain key decisions that can be combined in three areas:

- Scientific and technological support for forecasting in the field of climate change;
- Development of the regulatory environment for management decisions in the field of state and municipal government;
- The complexity of planning, including monitoring the effectiveness of adaptation measures and their adjustment (if necessary) [2].

Actualization of development strategies for types of economic activity and sectors of the economy is determined as the key task. In terms of sectoral strategic decisions in transportation, climate change adaptation mechanisms have not found their way into the past period. Moreover, at the end of 2019 and 2020, a significant number of indicators of the transport strategy of the Russian Federation did not achieve the target values [16].

On November 21, 2021, the updated version of the Transport Strategy of the Russian Federation until 2030 [17] was approved with a forecast for the period until 2035. In the content part of the studied issue, the following provisions of the strategy deserve attention:

- The use of geographical advantages and the realization of the country’s transit potential through integration into world transport chains as part of the Eurasian Economic Union;
- Increasing the transport accessibility of territories, including geostrategic, remote, and hard-to-reach territories.

As a confirmation of the importance and relevance of the considered issues at the country level, on February 17, 2022, the round table “Problems of adaptation to local climate changes as a factor in formation of climate resilience of the EAEU member countries” was held at the Scientific Center for Eurasian Integration. One of the key topics was the importance of creating supranational regulation systems in the field of ensuring climate resilience, which will then be integrated into the EAEU regulation system.

The concept of managing the sustainable development of transport companies is an ambiguous tool for strategic development in current conditions.

Given mechanisms for solving environmental problems and ensuring resilience to climate change as a tool, particular attention should be paid to the ESG concept,

which determines the ratings of leading foreign companies in international markets. The ESG concept as sustainable development of commercial companies has recently gained great popularity as a tool for entering international markets and, accordingly, access to funds that support investments and innovations in green technologies and environmental safety. In 2004, UN Secretary-General Kofi Annan presented the report “The Caring Wins,” which formulated the basic principles of the concept of sustainable development. According to the abbreviation, the essence of the concept, which is actively supported by corporate and state funds (US and EU), is as follows:

- Environmental—environmental protection;
- Social—social development;
- Governance—corporate governance.

Thus, each concept corresponds to several priorities (strategic directions) with certain KPIs specific to each industry. Based on ESG principles, independent expert organizations determine the ESG index of companies’ attractiveness, which, in turn, determines the competitive advantages for foreign investors. About 800 companies in the USA have received the ESG rating in recent years; for comparison, Russia currently has no more than 135 companies [18].

According to 2021 data, the independent agency Raex-Europe published the ESG rating of Russian companies. It included 145 organizations; the top 5 included Russian Railways and Gazprom [18]. S7 Airlines and the road construction company Avtoban are among the companies that actively declare the concept of sustainable development in the transport sector.

S7 Airlines, which is one of the leaders in air transportation in the Russian Federation, also actively declares the ESG principles reflected in the published concept (according to the S7 Group ESG report for 2020) [19].

Measures are defined in terms of adaptation solutions to climate change; they are briefly systematized in Table 1.

Analyzing the experience of Avtoban and S7 Airlines, we can conclude that the events are mostly local, tactical in nature, and do not make it possible to fully implement the concept, according to the existing completeness of the western requirements for a number of objective reasons, the main of which are limited resources and lack of required investments.

Today, in connection with the current geopolitical situation, many experts see the concept of sustainable development as a political tool for restricting the entry of “undesirable” companies into the international market, which, in fact, is no longer related to environmental problems. These risks and the actual unavailability of western investment funds do not mean that this concept should be neglected. Guided by long-term solutions, it is apparent that it is necessary to include a mechanism for state regulation of the conceptual provisions of sustainable development as a tool for the development of the non-state sector of enterprises that form the industry (ESG technologies in Russia and the world) [18]. It should also be understood that such tools-requirements of the ESG concept as “carbon neutrality” and “carbon tax” are impossible in the conditions of functioning of a number of enterprises, especially in the transport industry of an industrial country, part of the transport routes of which

Table 1 A set of solutions of S7 Airlines in terms of adaptation mechanisms to climate change as part of the ESG concept

	Activity priorities	
	Basic principles of ERG	S7 airlines
Environmental	Resource-saving technologies	Fuel consumption is reduced by 5%;
	Responsible consumption	Reduction of energy consumption by 20% by installing heat regulators on radiators in all offices
		Reduction of consumption of cold and hot water in offices by 30% due to the installation of sensor mixers
		Reduction of paper use by 20 tons per year (equivalent to saving more than 200 trees) through the introduction of digital technologies, EFB, CCP, and SMI into the workflow, as well as accumulation of waste paper
	Reducing the negative impact on the environment	Reduction of the amount of de-icing liquid consumed at operating airports by 5–10% (300–400 thousand liters)
Governance	Reducing carbon footprint	Ecological project “We are Siberia”: more than 400 thousand trees were planted
	Development of the aviation industry through innovation	Maintenance center at Pulkovo Airport as part of the investment agreement with the Government of St. Petersburg. The innovation center based on S7 TechLab was organized
	Strategic partnerships for sustainable development	S7 Airlines is the only Russian member of the Oneworld global aviation alliance

Source Compiled by the authors based on [19]

falls on the regions of the Far North. Thus, this concept requires a revision of key decisions based on priorities of the national economy and strategically important priorities of international cooperation. More specifically, key decisions are required in terms of governance in the form of formation and specification of requirements for transport companies, including in relation to possible adaptation to climate change, which does not depend on political decisions.

The active development of the state ESG paradigm in the Republic of Belarus at the state level and the fairly large interest of commercial enterprises in open forms of ESG reporting and the creation of its own rating in the Republic of Kazakhstan should be noted after analyzing the process of implementing the ESG agenda in other countries of the Commonwealth. The experience of Belarus deserves interest. The BIK Ratings rating agency prepared a report on the results of 2021 “Green financing, ESG and their development prospects in Belarus,” which contains an overview of

the ESG rating methodology being developed at the national level [20]. The review also contains a list of 28 Belarusian companies based on the concept of sustainable development, which unites all three areas of ESG, including financial institutions and retailers. However, there is not a single transport company [21].

In 2022, in the Republic of Kazakhstan, the company PwC Kazakhstan published the rating of “50 best companies of information disclosure in the field of sustainable development,” the leader of which is JSC NC “KazMunayGas,” a Kazakh operator for exploration, production, and transportation of hydrocarbons. This is also the only company on the list related to the transport industry [22].

As for joint decisions within the framework of the commonwealths of states, this task is complicated by the heterogeneity and the presence of geo-economic features of the EAEU members. The members of the EAEU have a significant difference in the volumes, lengths, and types of transport networks, as well as volumes of cargo flows, which makes it difficult to form general principles of transport policy and implement climate change adaptation mechanisms (Fig. 1).

The “road map” for implementation of the transport policy of the EAEU countries, agreed in February 2021, contains measures that develop provisions of the Treaty on the Eurasian Economic Union relating to transport and infrastructure. It considers the specifics of the development of road, rail, and water transport as it ensures the implementation of tasks and priorities of the transport policy. Nevertheless, it does not place due emphasis on the problems of climate change, which is a strategically important task.

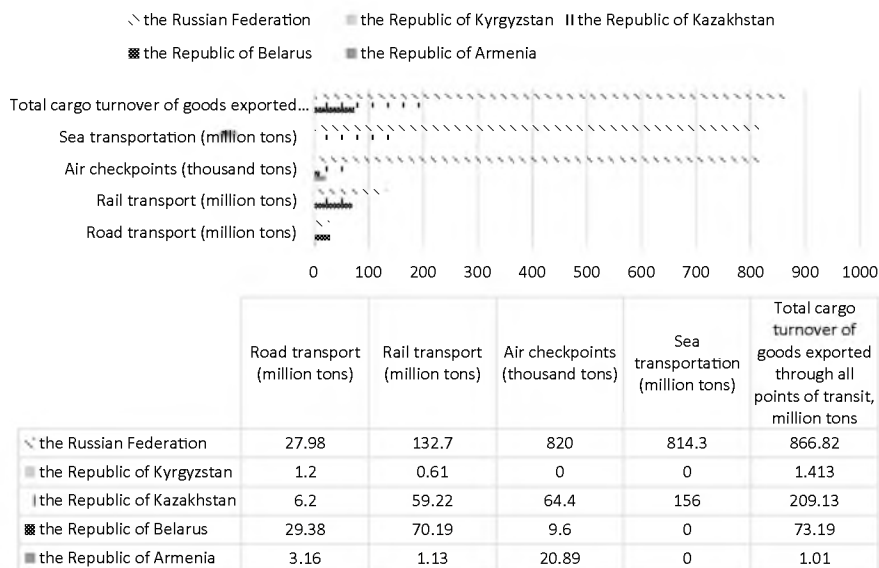


Fig. 1 Freight turnover of the EAEU member countries, considering the types of checkpoints. *Source* Compiled by the authors based on [23–25]

3 Results

Let us develop a list of proposals for areas of activity in the field of climate adaptation of transport.

In general, adaptation measures in the transport sector should be aimed at reducing vulnerability and increasing the resilience of systems to climate factors. This implies not only the physical strength and durability of the infrastructure to withstand adverse impacts but also the ability to quickly restore at minimal costs.

At the heart of transport climate adaptation is a system for monitoring climate change manifestations and extreme climate events, which can have a wide variety of impacts on the transport infrastructure and transport services. By improving and expanding climatological support, it is possible to significantly increase the efficiency of the design and operation of the transport infrastructure [16].

The institutional group of proposals in terms of realizing the transport potential of the EAEU includes the following:

- Proposals on amendments to the requirements for project documentation. The potential impact of changing climate must be considered when planning, designing, constructing, and operating the transport infrastructure;
- Proposals on information and analytical support of the decision-making process on the relevant range of issues by the state authorities of the EAEU participants and the Russian Federation, local governments, and business entities, including the development of the legal and regulatory framework and organization of state regulation in the field of adaptation to climate changes;
- Proposals on the development of economic mechanisms related to the implementation of measures aimed at adaptation to climate changes;
- Proposals on monitoring new domestic and foreign technologies and experience in obtaining, collecting, transmitting, storing, and presenting climate and related information and information products necessary for solving regulatory, scientific, technical, economic, military-strategic, and other tasks when adapting to climate changes with a view to subsequent implementation in operational work;
- Proposals on the development of training and advanced training programs for specialists of the relevant specialization;
- Proposals on informing society about ongoing and expected climate changes, their causes and consequences, and possibilities of adapting to them. The climate provision of transport industries differs not only in the specifics of the information provided for each type of transport but also in their scale, which is due to the length of transport routes, measured by many thousands of kilometers;
- Proposals to promote the fulfillment of international obligations, including by the Russian Federation, in the field of monitoring, assessing, forecasting climate changes and their consequences, and adapting to them, including obligations under the UNFCCC, synchronization of management decisions regarding the ESG concept, and determination of common methods and ratings as part of agenda of sustainable development across the Commonwealth states.

The set of proposals on the example of the Russian Federation includes the following:

- Proposals on adjusting the strategy for the development of the transport industry, considering the need for its adaptation to climate changes and variability of climate;
- Proposals for land (road and rail) transport are associated with an increase in the number of hazardous phenomena, such as fog, heavy rains, snow avalanches, dangerous snowfalls and blizzards, and sandstorms;
- Proposals on winter maintenance of roads, safety, and uninterrupted traffic on roads in difficult climatic conditions. In winter, the danger on the road is due to its slipperiness associated with black ice and snow run-up. Frequent temperature fluctuations in winter also contribute to the destruction of road surfaces;
- Proposals on summer road maintenance. Rising temperatures and long periods of hot weather negatively affect roads, causing softening of asphalt pavement;
- Proposals on railway transport at high and low temperatures. Extended periods of extreme high and low temperatures can cause deformation of railway rails, resulting in reduced travel speeds and accidents on the railways;
- Proposals on the transport infrastructure in the north of the Russian Federation. Melting permafrost will damage the infrastructure. It causes subsidence of the subgrade and cryogenic swelling, which affects the strength and durability of roads and leads to deformation of the road surface;
- Proposals on responding to the expected increase in water runoff and river floods in certain regions of Russia. These phenomena will have the most catastrophic consequences precisely for transport networks because the main roads and railways run along the flood plains or cross them;
- Proposals on considering the effect of heat on inland water transport. Inland waterways can be severely affected by lower water levels during heat waves. This may lead to fewer shipping routes, shorter navigation periods, reduced cargo capacity, increased fuel costs, and more frequent groundings of ships;
- Proposals on changing timing and processes of freezing and opening of rivers and reservoirs. Due to the ongoing warming of the climate, a reduction in the period of freeze-up on Siberian rivers with a simultaneous decrease in the maximum thickness of ice should be expected. Significant changes are also possible in the timing and processes of freezing and opening of rivers and reservoirs;
- Proposals on the port infrastructure. Changes in the sea level and increased destructive power of storms will damage the port and cargo infrastructure due to flooding and increased costs for the construction and maintenance of ports. The permafrost retreat and the reduction of the Arctic ice area may also lead to disruption of the seaport infrastructure. A positive aspect of this process for Russia is an increase in the period of navigation along the Northern Sea Route, as well as a reduction in fuel costs;
- Proposals on air transport. Rising air temperatures could adversely affect various airport infrastructures, especially runways, while airports in northern regions could benefit from reduced snow and ice clearance costs. Frequent extreme

temperature rises can create operational problems such as increased power consumption by aircraft on the ground;

- Proposals for strengthening the role of science in adaptation to climate change. Proper proactive adaptation to climate changes will not work without deep, technological, supplied by workers, fundamental, and applied research. Simultaneously, the most important component of the scientific substantiation of adaptation measures is economic assessments that require methodological refinements;
- Proposals on pipeline transport. Dangerous consequences of climate changes for the oil and gas industry in the Arctic are related to the permafrost retreat;
- Proposals on priority projects of the land transport infrastructure. Among the priority projects for the development of the transport infrastructure in the Arctic, the Northern Latitudinal Railway can be singled out—the construction of a railway line (including a bridge across the Ob River), which will connect the existing sections of the Northern and Sverdlovsk railways;
- Systematization and integration of the listed proposals into a sectoral plan for adaptation to climate changes in the field of transport.

The earlier estimate of the cost of overcoming climate change in 1% of global GDP [5], which for the Russian Federation will amount to \$14 billion or more than 1 trillion rubles (1% of \$1.4 trillion of Russia's GDP). From the economic point of view, comparing the costs of maintaining the transport infrastructure of the Russian Federation, considering climate risks, pays off with the capacity of the freight transportation market in Russia. Thus, all invested funds are returned to the economy.

4 Conclusion

Taking the foregoing into consideration, it can be noted that the effective counteraction of the transport complex to climate change as part of the EAEU and the Russian Federation is implemented at the institutional and technical levels of regulation, with a significant degree of interest in cooperation in solving existing problems.

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