

OVERCOMING INFRASTRUCTURE BARRIERS TO THE DEVELOPMENT OF THE INTERNATIONAL NORTH-SOUTH TRANSPORT CORRIDOR



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INTRODUCTION

The problem of finding new ways to implement exports and deliver imports of Russia is becoming a key concern driving the restructuring of transport and logistics routes in Eurasia and the development of the International North–South Transport Corridor (INSTC). The initiative to create the corridor has a long history, but the aggravation of international political competition and the escalation of sanctions in recent years add arguments in favor of accelerating existing projects along the route and launching new ones.

The INSTC is the most important part of the Eurasian transport framework. Connecting with most East-West (China-Europe) latitudinal Eurasian transport routes, the INSTC connects northern Europe with the countries of the Persian Gulf and the Indian Ocean through Russia, the Caucasus and Central Asia without having to use the infrastructure of the Suez Canal. The INSTC can play a significant role in the formation of «new logistics» and the development of international transport and logistics chains.

Today, the INSTC transports a wide range of goods, including grain, coal, and ferrous metals, and freight volumes are growing in all directions and modes of transport. However, the further development of the INSTC faces a range of infrastructure limitations and related problems. This review examines the main problem areas of the existing corridor routes, current expansion projects, and possible ways to ensure capacity sufficient in order to fully realize the potential of mutual trade between key participating countries.

STRUCTURE OF THE INTERNATIONAL NORTH-SOUTH TRANSPORT CORRIDOR

- The western branch of the corridor (by land): direct rail connection across Russia — railway border crossing (RBC) Astara (Azerbaijan) — Astara (Iran) with subsequent reloading onto road transport due to the absence of the Astara — Rasht railway section, with the possibility of reloading onto the railway for transportation across Iran. Also, road transport can be used throughout the entire section for shipment to the sea ports of Iran. Cargo from Georgia and Armenia can be involved in the process. The length of the route section from Astrakhan to the port of Bandar Abbas is about 3,000 km.
- 2. The eastern branch of the corridor (by land): direct railway connection Russia — Kazakhstan — Turkmenistan — Iran with access to the Iranian railway network and a change in gauge from 1520 mm to 1435 mm via the Sarakhs (Turkmenistan) — Sarakhs (Iran) or Akyayla (Turkmenistan) — Incheh-Borun (Iran) railway checkpoints. The length of the route section from Astrakhan to the port of Bandar Abbas is about 4,000 km.
- 3. The Trans-Caspian branch of the corridor (land and sea): a multimodal route through the Caspian Sea using Russian ports (Astrakhan, Olya, Makhachkala) and ports in northern Iran (Anzali, Nowshahr, Amirabad) in the Caspian Basin, as well as the road and rail infrastructure of Iran. The length of the route section from Astrakhan to the port of Bandar Abbas is about 2,800 km.

All routes deliver to the ports of southern Iran (Bandar Abbas, Chabahar) and cargo is shipped onward to India, the Persian Gulf countries or East Africa. At the same time, the corridor currently functions largely within the framework of Russia's trade with Iran, i.e. the consignees are Iranian companies. Also, the eastern route of the INSTC is used for the transportation of <u>Belarusian fertilizers to China</u>; so it must be noted that the interested countries isn't limited to the participants of the corridor itself.

Currently, all three branches of the INSTC operate with varying degrees of regularity. Container delivery from Moscow to the port of Bandar Abbas via the INSTC takes from <u>14 days</u>.

MAP OF ROUTES OF THE INTERNATIONAL NORTH-SOUTH TRANSPORT CORRIDOR





Source: Freight transportation by JSC Russian Railways

INDICATORS OF THE INSTC

The growing importance of the INSTC is reflected in the dynamics of cargo transportation. According to various estimates, from 2022 to 2023, the total volume of transportation along the North-South corridor increased by 18% — from 19 to 22.6 million metric tons. According to the Directorate of International Transport Corridors, a non-profit organization, most transportation is carried out by rail. In 2022, 10.2 million tons of cargo were transported, and in 2023 this figure was 11.6 million tons (14% more). Transportation by sea demonstrated significant growth: in 2023, the volume increased by 55%, reaching 5.5 million tons and equaling the figure for road transport.

In 2024, the volume of transportation along the INSTC demonstrated 19% growth and amounted to 26.9 million tons, <u>according to estimates</u> published by the Russian Ministry of Transport and the Directorate of International Transport Corridors. According to the press service of JSC Russian Railways, by the end of 2024, the volume of transportation by rail along the INSTC <u>exceeded 12.9 million tons</u>.

Table 1.

DYNAMICS OF INSTC CARGO TRANSPORTATION

	Volume of cargo transported, mln tons		Growth 2024/2023 гг.		
	2022	2023	2024	Absolute, mln tons	Relative, %
Total	.19	22.6	26.9	4.3	19%
Auto	5.3	<u>5.5</u>	no data	no data	no data
Sea	3.5	5.5	no data	no data	no data
Rail	10.2	11.6	12.9	1.3	11%

Source: Roscongress Foundation and others

The national project «Development of Transport Infrastructure» envisages an increase in the carrying capacity of the ITC railways from 8 million to 20 million tons in 2028. According to government plans, the carrying capacity of the INSTC should be <u>30 million tons in 2030 and 35 million tons in 2035</u>. At the same time, according to Russian authorities, freight traffic along the North-South ITC may grow to <u>32–35 million tons by 2030</u>. Analytical centers <u>have noted</u> a potential increase in freight traffic along the INSTC to 75 million tons by 2040, and the western branch of the corridor will remain the main direction (<u>42 mln tons</u>). According to Sergey Milushkin, General Director of JSC SEZ Lotos, the freight base along the INSTC is projected to grow to 100 million tons by 2050.

The volume of transportation along the eastern branch of the INSTC in 2023 amounted to 550 thousand tons, which is 9% more than in 2022. Iranian Ambassador to Russia Kazem Jalali <u>announced</u> the following indicators of cargo flow along the eastern branch of the INSTC: 650 thousand shipments were transported in 2023, from 1.8 to 2 million tons in 2024, which is a threefold increase. The potential of the eastern branch of the INSTC is estimated at 15 million tons annually, and according to the forecast of Russian authorities — 20 mln tons by 2030.

According to the authors, such a strong growth in freight traffic along the eastern branch will be achieved thanks to investments in infrastructure projects, which will be discussed in more detail below, as well as cooperation with <u>Afghanistan</u> and <u>Pakistan</u>, which will allow seamless freight transportation by rail to India. It is noteworthy that both <u>Afghanistan</u> and <u>Pakistan</u> have openly declared their intention to participate in the development of the INSTC, namely the eastern direction of the route.



DYNAMICS OF CARGO TURNOVER ON THREE INSTC ROUTES, MLN TONS

Source: Ministry of Industry and Trade, Ministry of Economic Development, Covernment of the Russian Federation, Ministry of Transport of the Republic of Kazakhstan

Today, the eastern branch of the INSTC demonstrates the lowest freight traffic indicators among all three routes, and the leading route is the western branch of the corridor. However, from an infrastructural point of view, the potential of the eastern branch, oriented towards rail freight transportation, should be noted, since transportation along it is possible without changing the modality along the entire route to the south of Iran.

However, <u>N.Trans Lab</u> forecasts regarding the eastern corridor are less optimistic. According to the baseline scenario, the potential for cargo flows along the INSTC will reach 46 million tons by 2030 and 60 million tons by 2040. The total potential volumes of transported cargo by 2030 are quite consistent with the estimates of government agencies, but the figures for each direction differ. According to the N.Trans Lab forecast, the bulk of cargo in the baseline scenario will be sent via the western corridor — 35 million tons by 2040, while the share of the eastern direction will account for less than 12% (7 million tons). According to the most optimistic scenario, cargo turnover along the INSTC will reach 75 million tons by 2040 due to the additional transportation of oil and coal as a result of congestion in the eastern ports and the Azov-Black Sea basin. In this case, the figures for the eastern direction will approach 15 million tons.



CARGO BASE OF THE INSTC ACCORDING TO THE OPTIMISTIC SCENARIO FOR 2040 BY ROUTES, MILLION TONS

Source: N.Trans Lab

Within the framework of the INSTC, it is advisable to carry out container transportation of mainly food products, the share of which can amount to 35% of the total volume of container cargo. In addition, a significant portion of the cargo flow <u>consists of</u> ferrous metals (28.8%), sawn timber and pulp and paper products (16.6%), chemical industry products (11.2%) and non-ferrous metals (6.8%). According to the study, container traffic by 2040 can amount to about 1.5 million TEUs, or more than 20 million tons. At the same time, the <u>EABR forecasts</u> are more modest. Depending on the scenarios, the container transportation potential of all three routes can vary from 325 to 662 thousand TEUs (from 5.9 to 11.9 million tons) by 2030. According to N.Trans Lab forecasts, container cargo traffic will exceed 16 million tons by 2030.

Russian Railways prefers to use the eastern branch for cargo transportation. In 2022, the share of the eastern route in the transportation of the Russian railway operator was 66.8%, in 2023 it was 99.1%, and in 2024 it was 78.3%. According to RZD Logistics, in 2024, a total of 2.4 thousand TEUs were transported along the International North-South Transport Corridor, and 1.9 thousand TEUs were sent via the eastern route.



FREIGHT TRANSPORTATION INDICATORS ON THE RUSSIAN RAILWAYS NETWORK IN 2022–2024, TEUS

Source: RZD Logistics

The first commercial cargo was shipped along the eastern branch of the International North-South Transport Corridor in July 2022. UTLC ERA, together with RZD Logistics, organized the transportation of containers with export cargo from the Russian Federation. The train consisted of 39 twenty-foot containers with bitumen roofing sheets and covered 3,800 km. The cargo was transited via the railways of Kazakhstan, Turkmenistan and Iran, with subsequent shipment by sea to a port in India.

N.Trans Lab, in its <u>study</u>, describes in detail the structure of Russian export-import transportation along the North-South International Transport Corridor; using this, it is possible to assess the cargo being shipped in both directions along each branch of the corridor.



STRUCTURE OF RUSSIAN EXPORT-IMPORT TRANSPORTATION OF THE INSTC IN 2023 BY ROUTE, THOUSAND TONS

Source: N.Trans Lab

Russia uses the INSTC primarily to export domestic goods; 71.9% of cargo is exported. The greatest imbalance is observed in cargo transportation along the eastern branch, where 98.9% of shipments consist of exports. In 2023, coal, ferrous metals, food products, oil products, timber and non-ferrous metals were transported along the eastern route of the INSTC.

STRUCTURE OF RUSSIAN EXPORT TRANSPORTATION ALONG THE EASTERN ROUTE OF THE INSTC IN TERMS OF CARGO, THOUSAND TONS



Source: N.Trans Lab

According to forecasts, in the next ten years the eastern route of the corridor will be used for the transportation of building materials, ferrous and non-ferrous metals, grain, food products, fertilizers and chemical products, and by 2040 the main commodity shipped along the eastern route may become coal (8 million tons annually).

COST AND TERMS OF CARGO TRANSPORTATION ALONG THE INSTC

According to calculations made by the Federation of Indian Freight Forwarders Associations, cargo transportation from Mumbai to Moscow via the INSTC <u>is 40-50% faster and 40-55% cheaper</u> than via the usual route through the Suez Canal.

The EABR report notes that the delivery time for cargo from Mumbai to St. Petersburg via the traditional trans-Suez route is 30-45 days, whereas via the overland route it is from 15 to 24 days; at the same time, cargo can be transported via the most regular eastern route in up to 18 days. According to RZD Logistics, the delivery time for sending cargo from Moscow to Bandar Abbas station in 2023 was reduced to 12 days, in particular due to the introduction of regular services (two trains per month) in April 2023.

For comparison: today FESCO Indian Line vessels regularly deliver cargo along the Novorossiysk — Nava-Sheva — Mundra sea route and in the opposite direction; the travel time is from <u>18 days</u>. <u>The cost</u> of transportation from the Indian port of Mundra to Novorossiysk is \$2,860 per TEU and \$3,520 per FEU.

<u>Calculations by the N.Trans Lab</u> research center allow us to determine the cost of cargo transportation along the INSTC and compare it with the indicators of sea routes. According to the center, the land-based western and eastern routes of the North-South corridor are the most favorable both in terms of cost and delivery times.

Table 2.

COST AND DELIVERY TIMES OF CONTAINERIZED CARGO FROM THE POINT OF DEPARTURE OF CARGO IN RUSSIA TO THE PORTS OF INDIA

Route	Cost, euros	Delivery time, days
Western route, INSTC	479	21–28
Trans-Caspian route, INSTC	564	34–40
Eastern route, INSTC	500	27–32
Moscow — ports of the Azov-Black Sea basin — Suez Canal — ports of India	500	35
Moscow — North-West ports — Suez Canal — Indian ports	621	38

Source: N.Trans Lab

Kazakhstan, which participates in the ITC via the Kazakhstan-Turkmenistan-Iran railway and sends cargo to Iran across the Caspian Sea from the ports of Aktau and Kuryk, is a territory for the transshipment of Russian and Indian cargo. According to calculations by the Union of Transport Workers of Kazakhstan, the western branch of the ITC is the most advantageous route for transporting grain from Orenburg to the Iranian border¹.

Table 3.

COST OF GRAIN TRANSPORTATION VIA THE INSTC FROM ORENBURG TO THE IRANIAN BORDER

Route	Distance, km	Cost, USD/ton
Trans-Caspian: Orenburg — Port Olya — Port Anzali	2,573	81.9
Western: Orenburg — Samur — Astara	2,460	52.8
Eastern: Orenburg — Bolashak — Serakhs	2,921	87.7

Source: Union of Transport Workers of Kazakhstan KazLogistics

¹ Based on materials from the presentation "Development and integration of Kazakhstan's transport corridors" by the Union of Transport Workers of Kazakhstan KazLogistics.

TARIFFS OF CARGO TRANSPORTATION

Differences in national tariff systems, as well as additional charges at transit ports and borders, complicate calculations and increase the cost of transportation along the INSTC. While tariff policies are coordinated between Russia and Azerbaijan, as well as Russia and Kazakhstan, including within the framework of the Council for Railway Transport of the CIS Member States, an effective mechanism for tariffing transportation with Iran and Turkmenistan has been absent for many years.

A unified system of customs and tariff preferences will contribute to the significant development of the INSTC. In October 2024, at a meeting of the Council of CIS Heads of State, President of Turkmenistan Serdar Berdimuhamedov proposed applying unified customs and tariff preferences on the INSTC.

The tariff policy of Russian Railways on the western and eastern branches of the International North-South Transport Corridor is aimed at stimulating the growth of transportation volumes. Thus, the company provides a <u>50% discount</u> on the transportation of ferrous metals through the Samur crossing on the border with Azerbaijan and then through the Boyuk-Kyasik — Gardabani crossing between Azerbaijan and Georgia, as well as through the Russian-Kazakh border stations and then through Turkmen Railways' Serakhs or Akyayla stations. Russian Railways also provides a <u>20% discount</u> on export-import container transportation along the eastern branch of the International North-South Transport Corridor — through the Russian-Kazakh border crossings, and then through the Bolashak — Serkhetyaka crossing between Kazakhstan and Turkmenistan.

At the same time, Kazakhstan provides a <u>40% discount</u> on rail transportation of all types of cargo, with the exception of grain, milled products and oil products, along the eastern branch of the INSTC.

However, a through railway tariff for the transportation of goods along the entire length of the INSTC route, operating on the principle of "from point to point" (for example, from Moscow to the port of Bandar Abbas), has not yet been approved.

Currently, active work is underway <u>on negotiations to establish favorable rates</u> on the eastern route, especially for rail transport.

The participants in the discussions are Russia, Kazakhstan, Turkmenistan and Iran. During the plenary session of TransRussia 2025, representatives of Russian Railways announced an agreement on the harmonization of competitive rates on the eastern route of the INSTC between the railway companies of the aforementioned countries.

RUSSIA'S TRADE INDICATORS WITH INDIA AND IRAN

Since 2022, Russia's trade has been reoriented towards the countries of the East and South. As part of the study of the competitiveness of the INSTC, it is appropriate to analyze Russia's cooperation with two main partners along this route: India and Iran.

In 2023, Russia exported goods worth \$67 billion to India, according to data provided by the International Trade Centre (ITC). During the same time, Russian imports from India exceeded \$4 billion. From 2021 to 2023, the volume of exports of goods to India increased 671.3% in value terms (from \$8.7 billion to \$67.1 billion).



VOLUME OF TRADE BETWEEN RUSSIA AND INDIA, BLN USD

Source: International Trade Centre

According to The Economic Times, the volume of trade between India and Russia via the International North-South Transport Corridor doubled over the past year. Construction materials, textiles, footwear, rice, plastics, confectionery goods, spices and food concentrates are delivered to Russia along this route. In the opposite direction, from Russia to India, pulp and paper products, lumber, hygiene products, furniture, roofing and produce.

As The Economic Times notes, citing the words of Dmitry Kryukov, Deputy General Director of Russian Railways Logistics for Multimodal Transportation, last year the cost of transportation services along this route decreased by more than 56%, and the volume of transportation increased by 1.7 times.

MAIN CATEGORIES OF GOODS EXPORTED FROM RUSSIA TO INDIA IN 2023, MILLION TONS



Source: International Trade Centre

According to the ITC, Russia exported 135.1 million tons of cargo to India in 2023, which is 99.6% more than in 2022 (67.7 million tons). Crude oil made up the bulk of the exports — 65.8% (88.9 million tons) of the total volume of goods transported from Russia to India. In 2022, the figure was 37 million tons, and in 2021 — 4.5 million tons; the growth over two years was 1,875.6%. When adding up the figures for the transportation of crude oil and petroleum products, it comes to 72.8% (98.4 million tons) of the total volume of cargo transported. In 2023, Russia earned \$53.6 billion from the sale of oil and oil products to India, which is 79.9% of the total value of goods transported from Russia to India. Sea routes using tankers are mainly chosen for the transportation of oil products.

The next category of goods in terms of transportation volumes is coal. Compared to the sharp increase in the transportation of oil and oil products, the increase in coal transportation volumes was more gradual: 7.5 million tons in 2021, 18 million tons in 2022, 26.7 million tons in 2023; an increase of 256% over two years. Although the export share of coal in physical terms in 2023 was 19.8%, in value terms it was only 7.3% (\$4.9 million). At the same time, coal is an important commodity for rail transportation and occupies a leading position in the structure of cargo loading on the Russian Railways network. According to Russian Railways, in 2024, 331.4 million tons of coal was transported by rail (the share in the total cargo flow was 28.1%), of which Russia exported 196.2 million tons (177.6 million tons via the Russian Railways network). Coal was transported in 15.7 thousand TEUs containers.

Fertilizer transportation from Russia to India also plays an important role in trade relations between the two countries. In 2023, the volume of nitrogen, potash and mixed (containing two or three nutrients) fertilizers being transported amounted to 5.8 million tons, and the total value of the transported fertilizers exceeded \$2.6 billion. Compared to oil and coal, fertilizers are more often transported in containers via road or rail. According to Russian Railways, 67.6 million tons of chemical and mineral fertilizers were transported via the Russian Railways network in 2024, and the volume of container transportation amounted to 501.4 thousand TEUs.

In 2023, India primarily purchased mixed fertilizers — 46.6% of the total volume of all fertilizers transported. Nitrogen fertilizers (39.7%) and potash fertilizers (13.7%) were also in demand. Mixed fertilizers were the most expensive in India — \$516.1 per ton, followed by nitrogen (\$417.5) and potash (\$358.1). Nevertheless, as <u>RIA Novosti</u> reports, in the first eight months of 2024, Russian fertilizer exports to India in value terms amounted to \$998.7 million, which is 1.7 times less than in the same period last year. Instead of Russia, which was previously the leader, Oman and Saudi Arabia became the main suppliers of fertilizers.

The Republic of Belarus has been an important partner for India in the potash fertilizer market for many years. Belarusian potash has been consistently supplied to India in large volumes for over ten years. According to ITC data, in 2021, Belarus became the main supplier of potash: it accounted for 30.5% of potash fertilizer exports to India.



DYNAMICS OF BELARUSIAN POTASH FERTILIZER EXPORTS TO INDIA

Source: International Trade Centre

However, in 2023, there was a sharp (-92.5%) decline in Belarusian potash supplies in physical terms. As can be seen from the graph, from 2014 to 2021, supply volumes did not fall below 380.6 thousand tons, since a favorable pricing policy for India was maintained (from \$ 232.5 to \$ 326.7 per ton). However, in 2022, prices increased by 36.1% compared to 2021, due to which volumes decreased by 61.3%. Such price increases negatively affected trade relations between India and Belarus already in 2023, where the figures in physical terms only slightly exceeded 30 thousand tons, although the average price turned out to be a record low for the entire period under study. The main reason for such a decline may be related to the EU and US sanctions against Belaruskali and India's reluctance to fall under secondary sanctions.

According to the authors' estimates based on ITC data, Turkmenistan has taken Belarus' place thanks to the work of the Garlyk Potash Mining Complex. Potash export volumes from 2022 to 2023 increased by 1358.3% from 28 to 408.4 thousand tons and reached a value of \$160.3 million, with an average cost of \$392.5 per ton. In turn, the Republic of Belarus almost doubled its potash fertilizer supplies to China (from 1.9 million tons in 2022 to 3.4 million tons in 2023). In 2024, the figure showed a slight decline to 2.9 million tons, but Belarus confidently ranks second among potash fertilizer suppliers to China (after Russia). In February 2025, RZD Logistics reported that it had sent two full container trains with potash fertilizers from the Republic of Belarus in the amount of 124 SFE to China along the eastern branch of the North-South International Transport Corridor, using the territories of Russia, Kazakhstan, Turkmenistan and Iran for transit, and in the Iranian port of Bandar Abbas, the containers were loaded onto a ship and sent by sea to the ports of China. Then, in March, 62 SFE with Belarusian potash were transported along the same route.

Russia's trade turnover with Iran is more stable and tends to increase in volume — in 2023, the countries approached the mark of \$ 3 billion in mutual trade in goods. In mid-January 2025, Iranian Ambassador Kazem Jalali <u>claimed</u> that the volume of trade turnover between Iran and Russia exceeded \$ 4 billion by the end of 2024.



RUSSIA'S TRADE VOLUME WITH IRAN, BILLION DOLLARS

Source: International Trade Centre

In 2023, Russia exported 3.6 million tons of cargo to Iran. The bulk of Russian exports to Iran consisted of raw agricultural products — more than 2.9 million tons (82.8% of the total volume of export shipments). Among grains, wheat exports dominated — more than 1.9 million tons. Moreover, Russia traditionally ranks first among wheat suppliers, and in 2023, Russian export volumes amounted to 56.6% of total Iranian imports.



MAIN CATEGORIES OF GOODS EXPORTED FROM RUSSIA TO IRAN IN 2023, THOUSAND TONS

Source: International Trade Centre

In 2023, the value of grain transported to Iran amounted to \$1.16 billion (62.7% of the total value of export goods), wheat accounted for 68.9%, followed by corn (18.4%) and barley (12.4%). Grain, like fertilizers, is transported by rail. According to Russian Railways, 31.2 million tons of grain were transported via the Russian Railways network in 2024, and most of the shipments were export shipments. This conclusion was made based on Russian Railways statistics for the first half of 2024, according to which 15.9 million tons of grain were shipped via the Russian Railways network, including 11.3 million (71.1%) for export. The containerized grain transportation indicator for 2024 was 133.3 thousand TEUs.

In second place in terms of the volume of goods transported from Russia to Iran is wood and wood products, where sawn timber suppliers held a special place: 335.3 thousand tons in 2023, or \$190.1 million in value terms. In 2022, Iran imported 311.5 thousand tons of Russian sawn timber, an increase of 7.6% over the year. According to Russian Railways, in 2024, 26.3 million tons of forest cargo were transported via the Russian Railways network, and the number of containers was 579.4 thousand TEUs.

Russia is traditionally the main supplier, accounting for 61% of the share of sawn timber exports to Iran. However, this figure is gradually decreasing: 76% in 2020, 69% in 2021, 63% in 2022. At the same time, supplies from Turkey are increasing — they totaled 130.2 thousand tons in 2023. Thus, Turkey took almost a quarter (24%) of sawn timber exports to Iran, although this figure was 8% in 2020.

Of particular importance for Russia are the supplies of machinery, equipment and mechanisms to Iran. Although in 2023 the volume of transportation in value terms decreased by 31.5% compared to 2022 (182.7 and 125.1 million dollars, respectively), this export item occupies an important place in mutual trade. In particular, in 2023, nuclear reactors worth a total of 81.6 million dollars, parts of internal combustion engines worth 10 million dollars, and lathes worth 9 million dollars were transported.

In 2023, Iran spent 136.7 million dollars on potash fertilizers, but Russia's share among its suppliers was a mere 4.1% (5.6 million dollars). The main exporters were the UAE (\$104.9 million), Turkey (\$9.4 million), and Uzbekistan (\$9.2 million). In physical terms, Iran increased its import of potash fertilizers by 2.5 times — from 92.7 thousand tons in 2022 to 247.9 thousand tons in 2023.

Belarus was one of the key suppliers of potash to Iran. In 2022, it exported potash fertilizers for \$7.9 million (16.9% of Iran's total imports), placing second in terms of volume after the UAE. However, in 2023, there was a sharp decline to \$20 thousand (-99.7%). Then, in February 2025, Iranian Ambassador to Belarus Alireza Sanei <u>said</u> that the Iranian side was interested in purchasing Belarusian potash, and at the end of 2023, the ambassador noted that the parties had agreed to supply 400 thousand tons. For comparison: in 2022, a record year for the Republic of Belarus, 6.2 thousand tons of potash fertilizers were supplied.

INFRASTRUCTURE LIMITATIONS OF THE INTERNATIONAL NORTH-SOUTH TRANSPORT CORRIDOR

Infrastructure limitations are the main factor holding back the development of all three existing branches of the INSTC. The lack of coordination between the participating countries in matters of upgrading and expanding infrastructure, as well as the inconsistency of the deadlines for implementing infrastructure projects in different countries and other disagreements between these nations also complicate progress. All participating countries are interested in realizing the transit potential of the corridor, but each of them is pursuing its own goals and seeks to redirect freight flows to its territory.

Differences in the width of the railway gauge of the participating countries require the use of special techniques and procedures for the reloading and transshipment of goods at the junctions of different railways, which leads to an increase in the time and cost needed for freight transportation.

Due to various barriers, freight transportation along the ITC is carried out with significant delays, especially at land border points and seaports. According to UNESCAP, 50% of transit time is spent on crossing borders. Thus, the duration of transportation between Moscow and the port of Bandar Abbas, which should be six days along the western route, doubles due to delays at border crossings and reaches 10-13 days.

Along with the aforementioned barriers common to the ITC, each of the three branches has its own specific restrictions.

Western branch

The western branch of the INSTC is the largest artery of the corridor, which currently accounts for about <u>70% of the total freight traffic of the ITC</u>. The main limitation of the western route today is the railways of the participating countries.

The Russian railway infrastructure is double-track, fully or partially electrified tracks with a carrying capacity of about 60 million tons per year, with the exception of the Derbent-Samur section, where the carrying capacity is only 8 million tons. The project for the construction of the Samur-2 station, the Derbent railway border crossing and plans for the development of the corridor's railway infrastructure will increase the total throughput capacity to 20 million tons per year by the end of 2027.

In 2023, as part of the investment program of Russian Railways, the development of design documentation was completed and construction work began on the transfer of the Russian <u>Derbent</u> — <u>Samur</u> — <u>State Border</u> section to an AC traction system. According to the company, this will reduce the cost of servicing and repairing locomotives, as well as reduce the downtime of trains at the Derbent station when changing types of current.

In Azerbaijan, the route features a double-track electrified section, Samur — Shirvan, with a carrying capacity which is half that of Russia — up to 30 million tons. Further along the route, the capacity of the Shirvan — Astara section narrows to 10 million tons, but at the moment it is being reconstructed and the capacity is being increased to 30 million tons.

Further along the route in Iran, most sections of the railway are single-track, non-electrified and limited to a capacity of up to 10 million tons. In addition, the unfinished 165 km-long railway section in Iran from Rasht to Astara creates additional difficulties associated with the handling of containers.

The construction of the Astara — Rasht section was discussed for a long time during the trilateral negotiations between Iran, Azerbaijan and Russia. Finally, in May 2023, an intergovernmental agreement was signed between Russia and Iran on the construction of the Astara — Rasht section with a total project cost of <u>1.6 billion</u> euros. According to the head of the Russian Ministry of Transport, Vitaly Savelyev, the construction of the railway section is planned to be fully complete by 2028.

The implementation of this project will ensure continuous rail service on this route without a need for the transshipment of cargo to other modes of transport, and will increase the carrying capacity to 15 million tons, which, however, is also not enough for a full connection with the railway infrastructure of Azerbaijan.

Today, cargo is sent through the Astara-Rasht section by road, which slows down the transportation process several-fold and causes additional risks of damage or loss of goods.



UNFINISHED RASHT-ASTARA SECTION OF THE QAZVIN-ASTARA RAILWAY LINE

Source: Report of the Eurasian Development Bank

In addition, this section runs through the city of Anzali, where a major Iranian port is located. Anzali is a free economic zone of Iran, where organizations implementing long-term investment projects are provided with benefits in the form of tax exemptions and property protection guarantees. It should be noted that Russian and joint Russian-Iranian organizations are participants in this economic zone. As a result, due to the economic importance of this territory for both Iran and Russia, the construction of the Astara-Anzali-Rasht section is even more important.

The potential volume of cargo transportation on the Astara-Rasht route is estimated at 15 million tons. Moreover, the agreements between Russia, Iran and Azerbaijan note the target indicator for increasing the capacity to transport at least 15 million tons of cargo via the Astara-Bandar Abbas railway. Obviously, in order to implement such an initiative, it is necessary to complete the construction of the Astara — Rasht section.

Moreover, Russia and Azerbaijan have signed an agreement on the joint development of transit freight traffic along the International North-South Transport Corridor. Under the agreement, the Azerbaijani side will receive funds to modernize its railway infrastructure with a guaranteed cargo volume of at least <u>5 million tons</u> by the end of 2027. The states will also ensure freer movement of goods across their territories, taking into account the legislation and customs control rules of the two countries.

An alternative route is the Nakhchivan (Azerbaijan) — Julfa (Iran) section, from which an operating railway runs to Bandar Abbas. The problem with this corridor is the closure of the railway section passing through Armenia due to tense political relations between Azerbaijan and Armenia. The Zangezur Corridor project is designed to solve the issue of accelerating the passage of goods, and with the successful cooperation of the interested parties, the construction of the section is planned to be completed by the end of 2028. It is also worth mentioning the problem of different track gauges in Russia and Azerbaijan (1520 mm) and Iran (1435 mm).

At the same time, Iran and Russia are striving for a radical solution to the problem of different track gauges. As of November 2024, the countries are negotiating the construction of a railway with a <u>Russian standard track gauge</u> from the Iranian city of Parsabad on the border with Azerbaijan to the largest Iranian port, Bandar Abbas. Thus, in addition to the Astara — Rasht section, the Russian authorities are interested in investing in a railway project with a 1520 mm track gauge, which can provide Russia with direct access to the Indian Ocean. However, the implementation of such a scenario requires significant investments in Iranian infrastructure.

<u>The situation is the opposite</u> in terms of road transport infrastructure. Two-lane sections of highways in Russia with a capacity of 14 thousand vehicles per day are transformed in Azerbaijan and Iran into four-lane sections for 40 thousand vehicles, and in the Tehran area — for 80 thousand.

Federal highway R-217 is an important part of the «North-South» corridor, along which transit flows to the countries of the Transcaucasus. The highway passes through the territory of seven subjects of the Russian Federation, six of which are regions of the North Caucasus Federal District. This is the main transport artery of Dagestan, connecting all major cities of the republic, which is currently undergoing large-scale modernization in order to expand its capacity. About 80 km of the highway will be expanded from two to four traffic lanes. At the same time, the Russian-Georgian section of the Dariali — Verkhny Lars checkpoint is in a state of constant congestion, which is complicated by severe weather conditions in the winter season: the road is closed or difficult for heavy trucks on average 90 days a year, which disrupts the transit chain. The construction of the largest tunnel in the Caucasus under the Cross Pass will speed up the delivery of goods from Tbilisi to Dariali by an hour and a half, and transit travel will be possible throughout the year. The cost of the project exceeds 500 million dollars. In 2024, the drilling of the tunnel was completed, and work is underway to organize traffic on the section.

Trans-Caspian branch

The Trans-Caspian route is limited by the low capacity of the Russian Caspian port infrastructure — 23.5 million tons per year, which is due to the insufficient capacity of the fleet, coupled with limited technical characteristics and the vessels' high degree of wear and tear. In total, there are 171 vessels with an average age of 35 years and a capacity to transport 8 million tons per year.

The comparatively low capacity of the Caspian Basin ports is reflected in the cargo transportation statistics: cargo turnover figures are less than 1% of the total volume of cargo transportation by sea in Russia.

Table 4.

CARGO TURNOVER OF RUSSIAN SEAPORTS, MILLION TONS

Basins	2021	2022	2023	2024
Total	835.2	841.9	883.8	861.9
Azov-Black Sea	256.8	263.9	291.4	275.6
Baltic	252.8	245.6	248.6	248.7
Far East	224.3	227.9	238.1	236.5
Arctic	94.3	98.5	97.9	93.0
Caspian	7.0	6.0	7.8	8.1

Source: Ministry of Transport of Russia

According to the data of the InfraNews information portal, cited in the <u>container</u> <u>report for 2024</u>, the container turnover of the Caspian Basin in 2024 decreased by 13.1% compared to 2023 (from 9.9 to 8.6 thousand TEUs), and the main factor in the decline was import deliveries — a decrease from 5 thousand to 3.8 thousand TEUs (-24.2%). The indicators of container turnover of exports have not undergone significant changes — 4.5 thousand TEUs in 2023 and 4.4 thousand TEUs in 2024.

The Russian ports of Olya and Astrakhan, whose throughput capacity is 1.5 and 9.9 million tons, respectively, require modernization and reconstruction. The low level of development of railway approaches to the port of Olya also reduces the possibility of transporting goods in the direction of the port. The freezing of the ports of Astrakhan and Olya requires the use of icebreaker escorts during the winter navigation period. Eliminating these restrictions by upgrading the port infrastructure and railway approaches to the ports will increase the capacity of the route by more than 8 million tons.

The government of the Russian Federation prepared an investment project passport for updating the fleet of air and water transport in February 2023, and significant changes are expected. Thus, in the period from 2023 to 2027, over <u>130 billion rubles</u> have been allocated for the construction of sea and river transport. The allocated funds will also allow domestic shipping companies to lease 260 vessels for various purposes in the next six years.

In addition, the domestic company Astra plans to create a <u>logistics center near</u> <u>Astrakhan</u> for the storage and transshipment of grain and frozen products, which will become possible after receiving the status of a resident of the port special economic zone (PSEZ) in the Astrakhan region. The implementation of the project will increase the capacity of the Caspian Sea ports, namely Olya and Astrakhan. Another obstacle is the shallowing of the Volga-Caspian Sea Canal. The Volga-Caspian Sea Shipping Canal (VCSSC) is a waterway connecting the Volga River and the Caspian Sea, a key element of the Trans-Caspian branch of the North-South ITC. The VCSSC connects a section of the Bakhtemir River (the main branch in the Volga Delta) and the Caspian Sea through the shallow part of the delta in the Astrakhan Region.

Since 2022, large-scale dredging operations have begun in the Volga-Caspian Sea Shipping Canal, providing ships with a navigable draft of 4.5 m along its entire length. This has made it possible to use modern vessels with a larger capacity for transportation across the Caspian Sea. As a result, the cargo turnover of seaports in 2023 amounted to <u>4.5 million tons</u>, and the volume of transpipment increased by 51% compared to 2022 figures.

Currently, some sections of the Volga-Caspian Canal remain one-way. The President of the Russian Federation gave an order to study the issue of ensuring two-way traffic of ships along the entire length of the canal. Funding for the further reconstruction of the VCMSC is provided from 2027.

The lack of railway approaches to the Caspian ports of Iran is also one of the infrastructure problems that are characteristic of the current state of the INSTC. Nevertheless, active interaction is noted in the direction of infrastructure development. In particular, at a meeting of the Prime Minister of the Russian Federation M.V. Mishustin with the President of Iran Masoud Pezeshkian, <u>plans</u> were discussed to organize regular shipping lines between the ports of Russia and Iran on the Caspian Sea in 2025.

Eastern branch

The eastern route is the most regular branch of the INSTC today, allowing direct rail transit between Russia and Iran through the territory of Kazakhstan and Turkmenistan, but also having its own infrastructure limitations.

EASTERN BRANCH OF THE INSTC



Source: N.Trans Lab

The sections of the railway in Kazakhstan, Turkmenistan and Iran are singletrack and non-electrified, which greatly limits the potential of rail transportation. The carrying capacity to Astrakhan of 27 million tons narrows by more than half, to 11 million tons, on the Russian-Kazakh section Astrakhan — Makat. Through the territory of Turkmenistan and Iran, the carrying capacity of the Bereket — Serakhs — Bafk and Incheh-Borun — Bafk sections is estimated at 10 million tons and 6 million tons, respectively. As N.Trans Lab notes in its <u>study</u>, the carrying capacity differs greatly from the actual freight traffic on the eastern branch of the INSTC.

Table 5.

UNUSED POTENTIAL OF THE EASTERN BRANCH OF THE NORTH-SOUTH ITC

Name of the section	Carrying capacity (mln tons)	Freight flow (mln tons)	Unused potential of the section (%)
Saratov — Astrakhan	27	20	26%
Astrakhan — Makat	11	2	82%
Makat — Beyneu	11	2	82%
Beyneu — Aktau — Bolashak	11	2	82%
Bolashak — Bereket	10	2	80%
Bereket — Incheh Borun	10	2	80%
Incheh Borun — Tehran	6	3	50%
Tehran — Bafq	10	3	70%
Bereket — Serakhs	10	1	90%
Serakhs — Bafq	10	1	90%
Bafq — Bandar Abbas	10	3	70%
Tehran — Ahvaz	10	~2-3	~70–80%
Ahvaz — Khorramshahr	10	~]	~90%
Ahvaz — Bandar-e Emam Khomeyni	10	~2	~80%

Source: N.Trans Lab

Due to the underdeveloped infrastructure of checkpoints, the problem of changing the gauge between the countries also remains, since Iran has a European gauge (1435 mm). The potential of the eastern branch is colossal, and provided that all possible barriers are overcome, freight turnover can reach 25-30 million tons annually.

As part of the modernization of the railway infrastructure and increasing the capacity of the eastern direction, the Turkmendemiryollary Agency and Russian Railways JSC agreed to ensure the carrying capacity of the Serhetyaka — Bereket — Akyayla/Serakhs section at a level of at least 7 million tons per year by 2025².

The issues of modernization of the Incheh Borun — Garmsar railway line in Iran remain relevant. The Russian Railways project in Iran, worth <u>1.2 billion euros</u>, envisaged the electrification of the Incheh Borun-Garmsar railway line with the supply of track equipment and 40 locomotives. Work on the electrification of the line began in July 2018, but construction has not yet been completed. In 2020, Russian Railways International suspended its activities on infrastructure projects in Iran, but, according to the Iranian side, electrification work will <u>resume</u> in 2023. It is expected that the implementation of the project will increase the capacity of the branch to 10 million tons annually.

² Based on the presentation materials of A. A. Zamkova, "Prospects for the development and role of the railway infrastructure of the International North-South Transport Corridor in ensuring the transportation of foreign trade cargo of Russia"



INCHEH BORUN — GARMSAR RAILWAY SECTION IN IRAN

Source: Caspian Herald

The railway bridges across the Volga on the Aksarayskaya — Astrakhan section are subject to reconstruction, which will increase the speed of train traffic on the bridges to 100 km/h with an increase in the carrying capacity of goods on the bridge to five million tons per year. It is reported that in 2024, <u>Russian Railways invested</u> 2.1 billion rubles in the construction and reconstruction of infrastructure facilities in the Astrakhan region of the Volga Railway. In particular, the Aksarayskaya-2 station is subject to reconstruction, a second track will be built on the section, and the railway bridge across the Volga is awaiting major repairs.

Another priority is the modernization and development of the Akyayla — Incheh Borun railway checkpoint at the border between Turkmenistan and Iran in order to increase the cargo throughput capacity to 15 million tons per year. This section is key along the eastern route of the INSTC, since it is where the track gauge changes (from 1,520 to 1,435 mm) and where cargo is transshipped. Increasing the operating speed of the border crossing point will increase the volume of cargo transported via the entire eastern route of the corridor.

The limitations of the motor transport infrastructure are similar to those along the western route: in Russia and Kazakhstan, there is a two-lane highway with a capacity of 14,000 vehicles per day to Beineu, and then in Kazakhstan, Turkmenistan and Iran — 40,000 vehicles. In its <u>report</u>, the EABR points out the need to reconstruct the Russian border — Aktobe — Atyrau and Aktau — Beineu highways in Kazakhstan, as well as to modernize the Karaozek checkpoint on the border of Russia and Kazakhstan. As part of the project to reconstruct the Karaozek checkpoint, by the end of 2024 it is planned to increase the capacity by more than two times (up to 2,000 vehicles per day). In 2025, the <u>reconstruction of the Zhanaozen (Mangistau region) highway</u> to the border with Turkmenistan with a total length of 229 kilometers will begin. The modernization of the transit corridor will provide access to Russia as part of the reconstruction of the highway to the Mangistau — Atyrau — Astrakhan region, and will allow Turkmenistan to improve its transport and logistics potential with the Mangistau region and beyond. After the reconstruction of the highway, the cargo flow should increase to 8 thousand vehicles per day. In addition, it is planned to build a new Turkmenbashi — Garabogaz — Kazakhstan highway and a new bridge across Garabogazgol Bay.

The study of the INSTC from the EABR pays much attention to investment projects, as well as their cost and implementation time. All projects are divided into three groups by priority, where the first group includes the highest priority, and the third - the lowest. When calculating the necessary investments for the investment projects of the first group, the EABR comes to the following conclusion: the western branch requires \$6.7 billion in financing, the trans-Caspian branch requires \$1.9 billion, and the eastern branch requires \$1.1 billion. If we take into account all three groups of projects, the result will be as follows: for the western branch — \$21.1 billion. Nevertheless, when excluding from the calculations the least promising projects related to the third group, the eastern branch again ranks last with \$5.3 billion, the trans-Caspian branch requires \$5.4 billion, and the western branch requires \$15.7 billion. Consequently, the eastern corridor, with the lowest costs, allows for the highest volumes of transportation to be achieved in the future.



THE COST OF INVESTMENT PROJECTS ON THREE ROUTES OF THE INSTC BY PRIORITY GROUPS, BILLION DOLLARS.

Source: Report of the Eurasian Development Bank

The seaport of Chabahar, located on the Makran coast of Iran, is of particular importance for the development of the INSTC, particularly the eastern route. The port city has a unique geographical location, linking India with Afghanistan and the landlocked countries of Central Asia. Chabahar is the only port in Iran with direct access to the Indian Ocean, although it is smaller in size than the largest Iranian port, Bandar Abbas on the Persian Gulf. After the completion of the adjacent railway network, the port will play a key role in the eastern route of the INSTC. The Chabahar route will lead to a 60% reduction in transportation costs and a 50% reduction in delivery time from India to Central Asia. Iran's Minister of Transport and Urban Development Mehrdad Bazrpash announced that the government plans to connect the port of Chabahar in southeastern Iran to the country's rail network via the city of Zahedan by March 2025. Iran Shipping Lines (IRISL) claims that container traffic through the port of Chabahar has grown to nearly 100,000 TEUs in the past three years.



IRAN'S ZAHEDAN-CHABAHAR RAILWAY PROJECT

Source: Vasti Press

In May 2016, India signed a trilateral agreement with Iran and Afghanistan to build the Shahid Beheshti Terminal at the port of Chabahar, which was commissioned in 2018. The project has already seen 2.5 million tons of wheat and 2,000 tons of pulses shipped from India to Afghanistan in recent years. In May 2024, the countries signed a <u>new agreement</u> on the development and operation of the port of Chabahar for a total investment of \$370 million from India. The new agreement was concluded for ten years, during which India will manage the port as the main external investor.

India views Chabahar as an important transshipment point in the region, located at the intersection of key commodity distribution lines of the BRICS member countries, the International North-South Transport Corridor and states gravitating towards them. India associates the development of the port with the possibility of the emergence of an international cross-trade service and the development of feeder cargo transportation in the region.

CONCLUSION

The development of the International North-South Trade Corridor is a strategically important task for Russia and the countries participating in the venture. In the context of changes in global logistics chains and the reorientation of trade flows to the south and east, this corridor is becoming increasingly important as an effective alternative to traditional routes.

An analysis of the current state of the INSTC shows that there are significant infrastructural barriers to its full-fledged development. Its key problems remain the lack of capacity on certain railway sections, the lack of coordinated tariff policies between the participating countries, the difference in track gauge, the lack of transshipment capacity in the Caspian Sea ports, as well as delays at border crossings. The solution to these issues requires comprehensive measures, including the modernization of transport hubs, simplification of customs procedures and coordination of efforts at the interstate level.

Increasing the importance of the INSTC is possible only with the active elimination of infrastructure restrictions. The key areas are:

- 1. Modernization of the railway network completion of the Rasht-Astara railway section in Iran, electrification of railways on the eastern branch and increase in their capacity.
- 2. Development of port infrastructure expansion of the capacity of the Russian ports of Astrakhan and Olya, modernization of the Volga-Caspian shipping canal, as well as improvement of port logistics in Iran.
- **3.** Development of container transportation increase in the container fleet, construction of new terminals and implementation of unified logistics solutions.
- **4.** Optimization of tariff policy coordination of through tariffs for rail and multimodal transportation along the entire route.

The growth of cargo turnover along the corridor requires consistent work to eliminate bottlenecks and create favorable conditions for carriers. According to forecasts, by 2030 the volume of transportation may reach 35 million tons, and by 2040 — 75 million tons, which will make the North-South ITC one of the most important transport corridors of Eurasia.

The implementation of the planned infrastructure projects, the intensification of international cooperation and the creation of favorable conditions for transit transportation will not only strengthen economic ties between the countries, but also turn the North-South corridor into a key transport artery of global logistics.