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HSR «EURASIA»

DEMAND FOR FREIGHT TRANSIT

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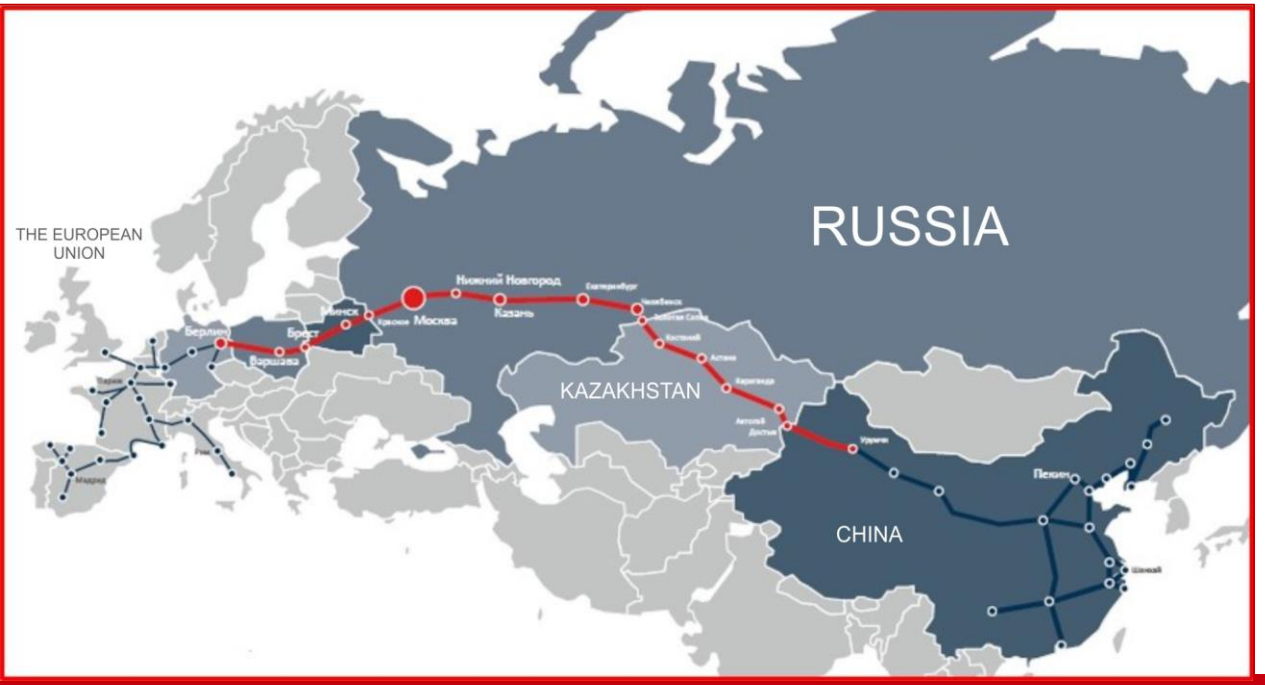
CREATION OF HIGH-SPEED FREIGHT-PASSENGER RAILWAY VIA RUSSIA

The purpose of the project is the formation of a high-speed passenger-and-freight railway corridor for cargo and passengers movement between China and Europe.

The implementation of the project will contribute to the solution of the following **tasks:**

- Significant strengthening of the global trade between China, Russia and European countries;
- Significant acceleration of rates of economic growth of the participating countries of transport corridor;



- Formation of a new source of revenues for railway companies and national budgets of the participating countries;
- Debottlenecking;
- Increase in economic effects including multiplicative and agglomeration effects.

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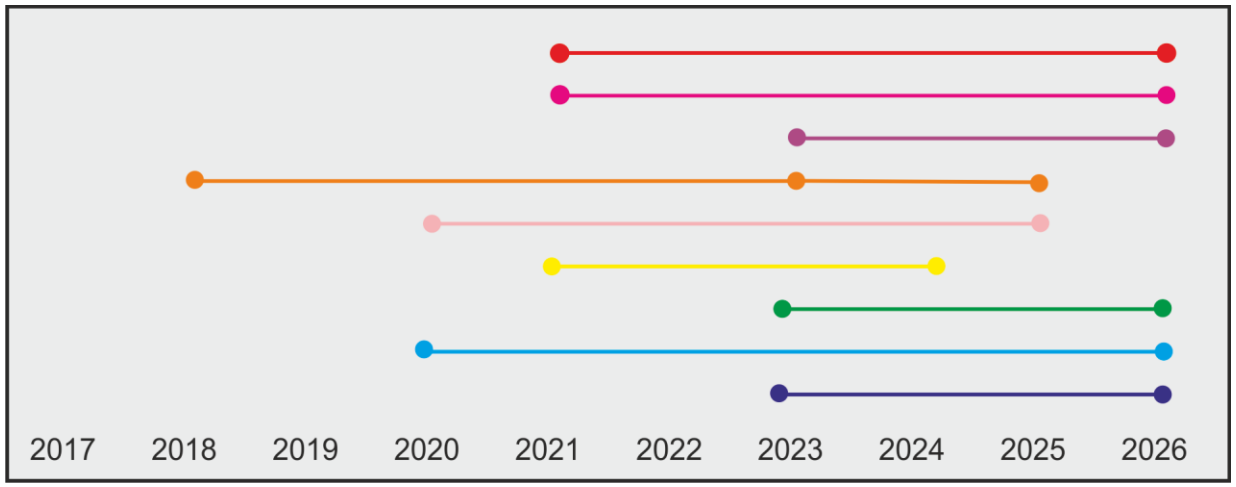
MAIN CHARACTERISTICS OF THE HSR «EURASIA»

- The length of the freight-and-passenger high-speed railway corridor "Eurasia" will be 9477* km and will allow to unite the largest transport systems of Europe and China

  **including Dostyk-Brest with a length of 4851 km*
- 350 km per hour - maximum speed for all sections
- The project assumes the use of gages, which are currently active in the countries participating in the corridor. For the former Soviet Union - 1520 mm, and for China and the EU - 1435 mm.
- The total capital expenditure on the project makes 7.08 trillion rubles excluding VAT in the prices of Q2'2017 for the Brest-Dostyk section (7.84 trillion rubles, taking into account China), including 3.58 trillion rubles excluding VAT in the prices of Q2'2017 for construction on the territory of the Russian Federation.

The schedule for the construction of sections of the HSR «Eurasia»



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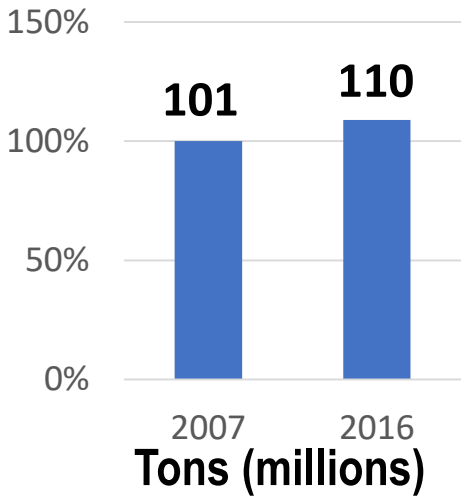
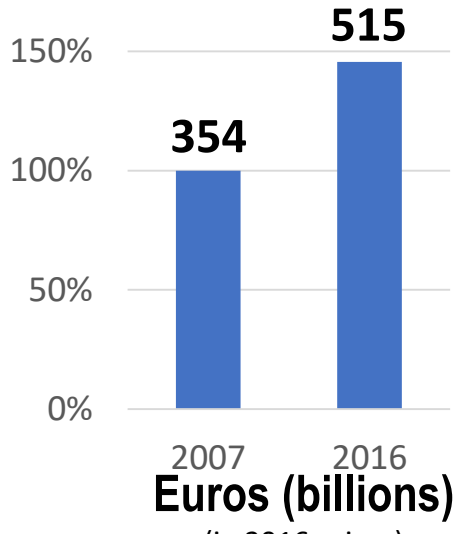
Main trends in freight transport between China and the EU for the past 10 years

Tons and money

Over this 10-year period, trading has increased 9% by weight and 46% by value



Tons (millions)



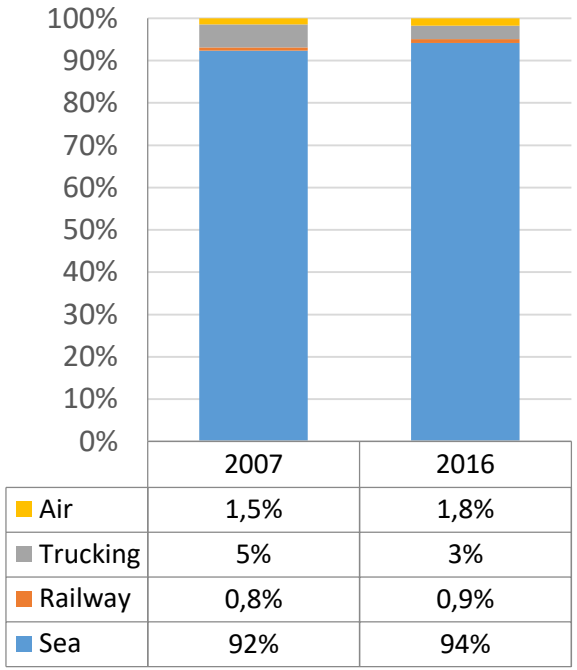
Euros (billions)

(in 2016 prices)

Rail transport has begun to occupy the middle competitive niche between aviation and shipping

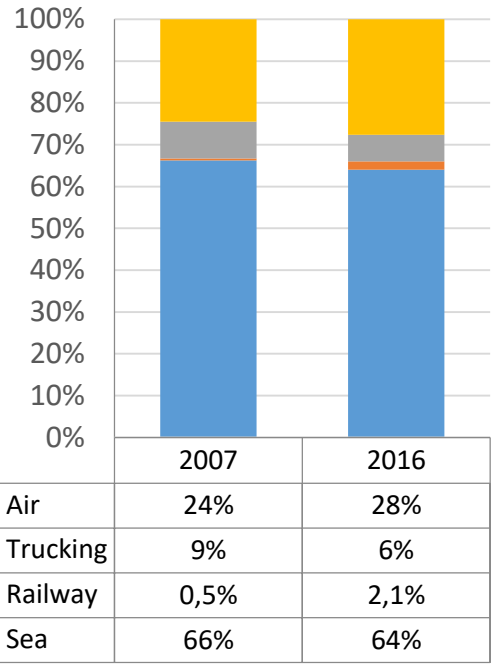
Euro/kg (in 2016 prices)	2007	2016	2016/07
Shipping	2,4	3,1	131%
Railroad	2,1	10,1	481%
Trucking	5,4	9,3	172%
Air transport	54,8	70,7	129%

In the composition of all freight transport between China and the EU, railroad accounts for the smallest percentage, yet shows the fastest growth



	2007	2016
Air	1,5%	1,8%
Trucking	5%	3%
Railway	0,8%	0,9%
Sea	92%	94%

Composition by weight



	2007	2016
Air	24%	28%
Trucking	9%	6%
Railway	0,5%	2,1%
Sea	66%	64%

Composition by value

Source: Eurostat, analysis performed by CEI

By value of goods transported, shipping has no monopoly. This fact only further highlights the potential demand for high-speed freight transport by rail.

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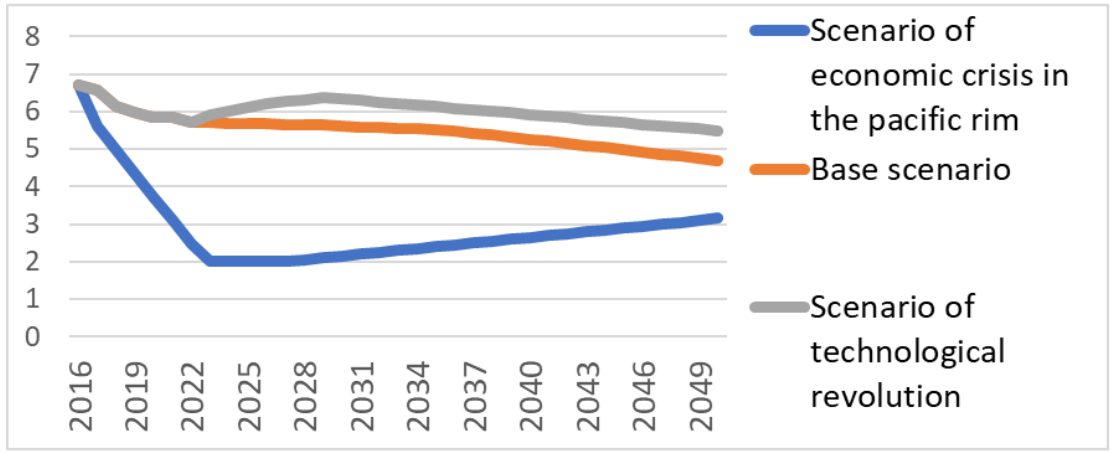
Long term forecast of trade between China and EU

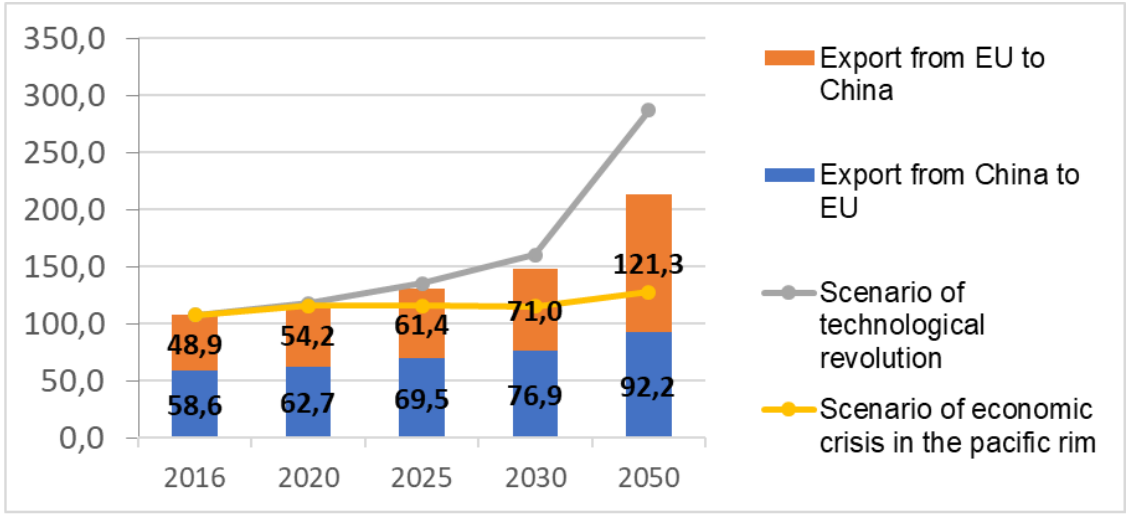
Scenarios and dynamics



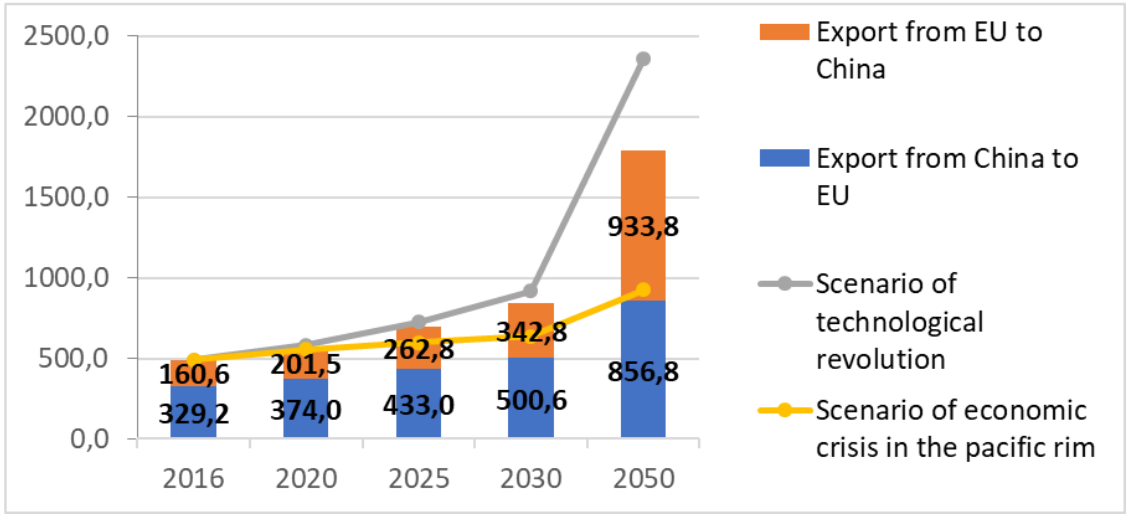
Growth in % GDP to previous year

- According to the volume of trade between China and the EU in the base year, by 2030 trade levels are expected to reach just under 150 million tons and 843 billion euro.
- In the event of crisis, trade is expected to be 30% lower. In the event of accelerated technologic progress, trade will increase by 10%.
- Exports in tons from the EU to China will exceed exports from China to the EU by 2020. The cost gap between exports from the EU to China and exports from China to the EU will gradually close.

Dynamic trading scenario in thousands of tons



Dynamic trading scenario in millions of euro



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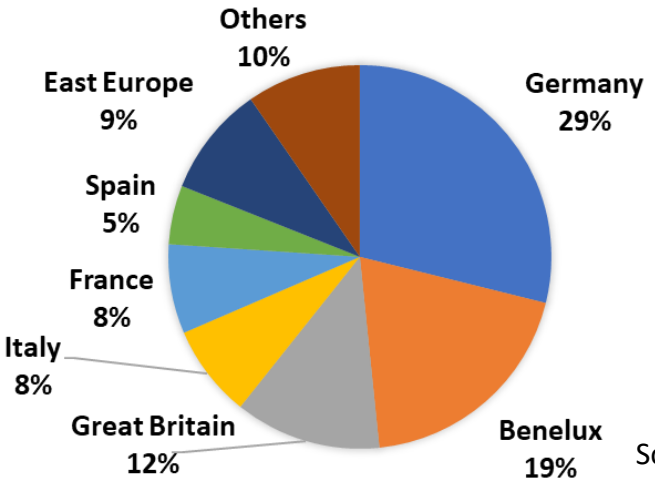
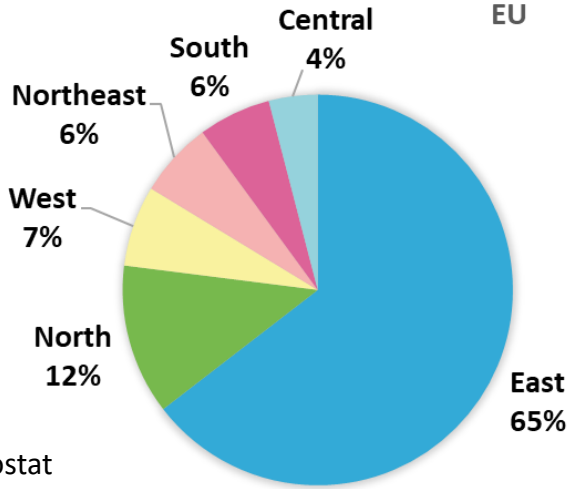
The geographic composition of trade between EU countries and China is highly centralized

Partners and regions

CHINA'S MAIN TRADE PARTNERS IN THE EU



THE SHARE OF THE MACROREGIONS OF CHINA IN TRADE WITH EU



Source: Eurostat

Summary

- Currently, routes between Germany/ Benelux and eastern China create the greatest demand for freight transport
- A significant proportion of imports from the EU is concentrated in the provinces near Beijing
- The largest center of online trading is concentrated in the provinces near Guangzhou
- The central and western provinces show the largest growth rates of exports

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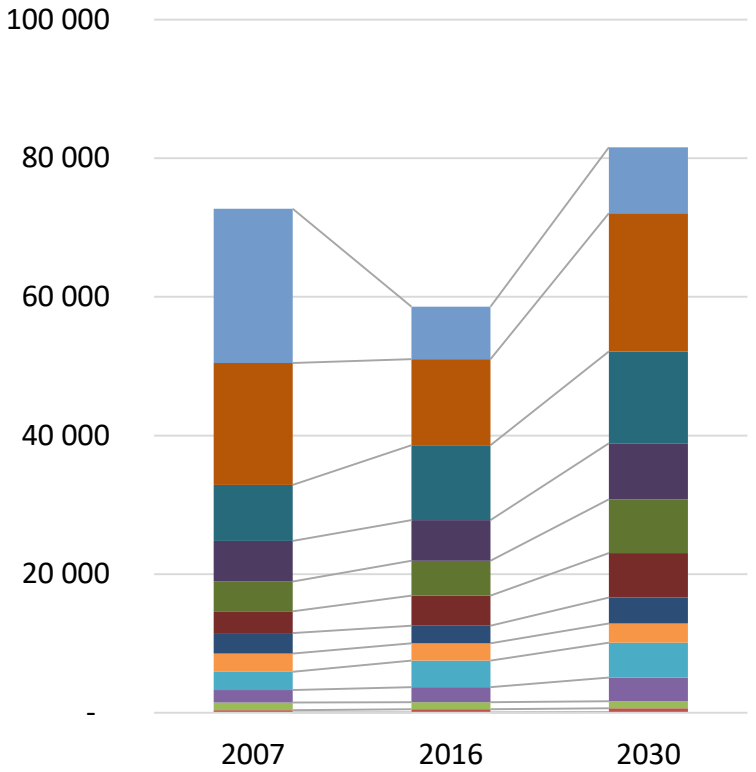
Compositional shifts in Chinese exports to Europe

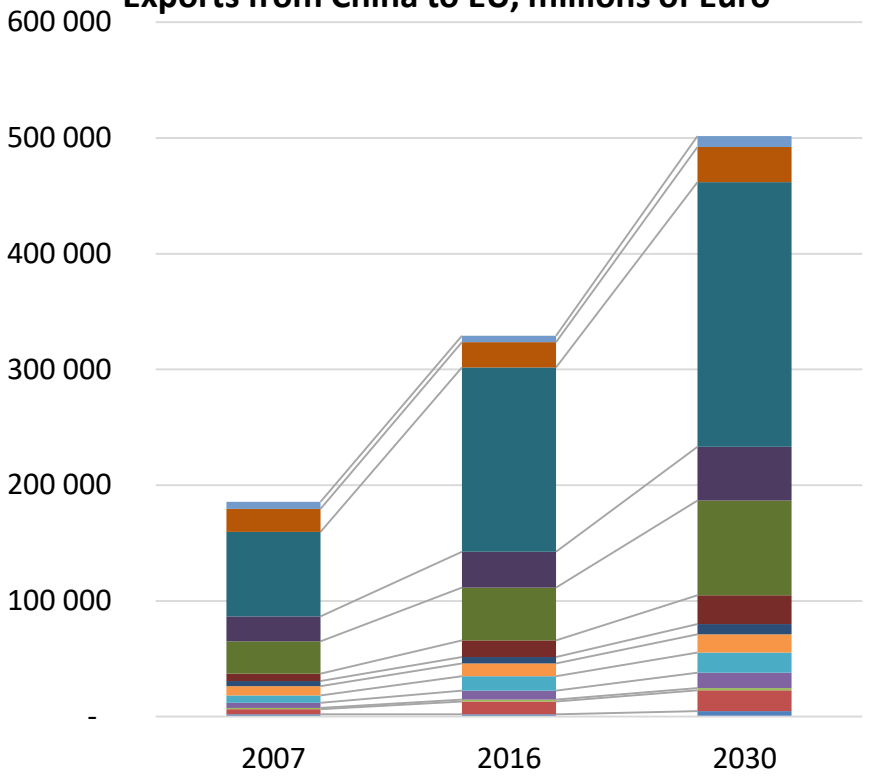
Base scenario

Exports from China to EU, thousands of tons



Source: Calculations of IEC

Exports from China to EU, millions of Euro



Source: Calculations of IEC

- Diversification of Chinese exports into the EU are expected along with growth in the percentage of goods exported with high added cost (including, but not limited to perishable goods).
- The percentage of industrial technical equipment and textiles and shoe manufacturing which can be transported by rail is significantly growing.

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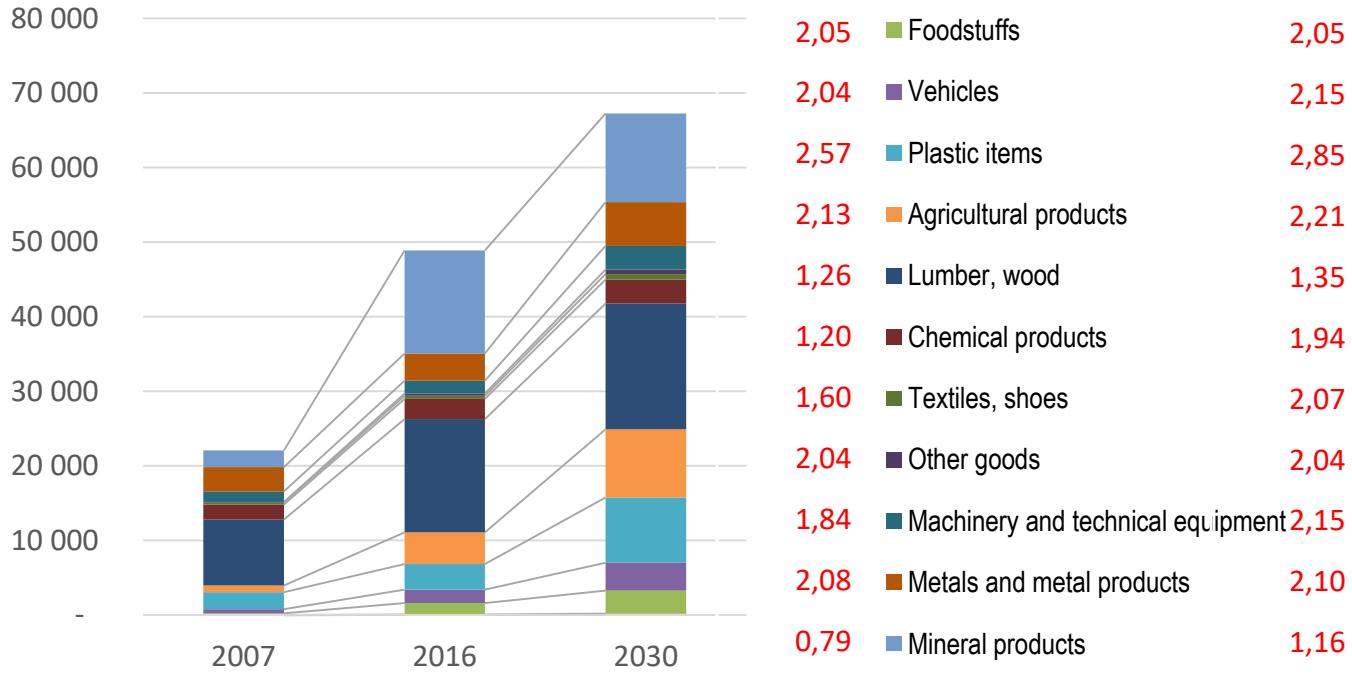
Compositional shifts in EU exports to China

Base scenario

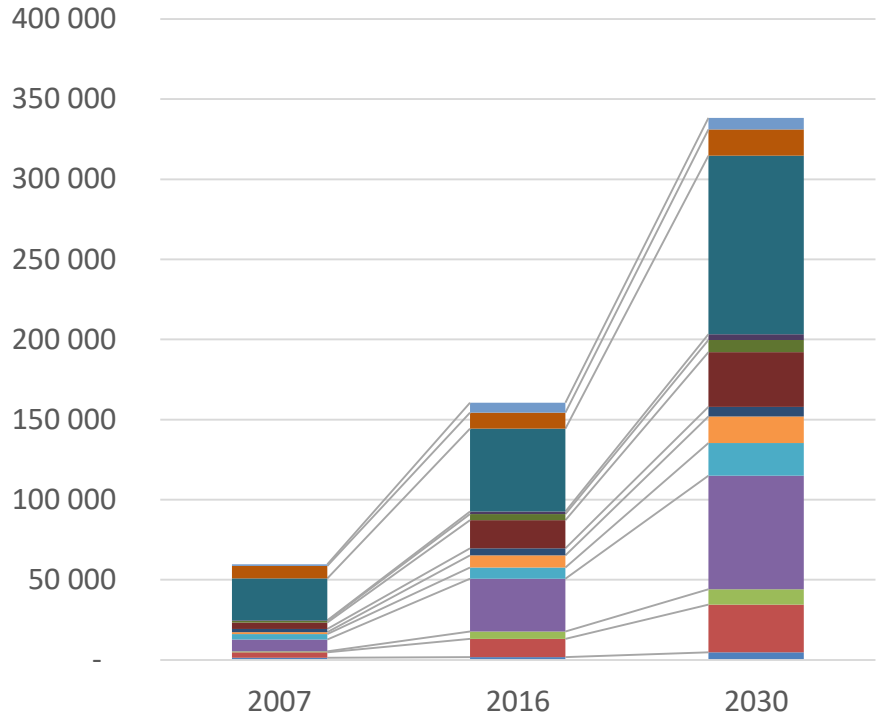
Exports from EU to China, thousands of tons



2030/2016		
2,86	Luxury items	3,00
2,25	Photo-optic medical equipment	3,02
2,05	Foodstuffs	2,05
2,04	Vehicles	2,15
2,57	Plastic items	2,85
2,13	Agricultural products	2,21
1,26	Lumber, wood	1,35
1,20	Chemical products	1,94
1,60	Textiles, shoes	2,07
2,04	Other goods	2,04
1,84	Machinery and technical equipment	2,15
2,08	Metals and metal products	2,10
0,79	Mineral products	1,16

Source: Calculations of IEC

Exports from EU to China, millions of Euro



Source: Calculations of IEC

- The largest growth in tonnage in EU-China exports will come from foodstuffs and plastic (mainly in the high-price segment).
- The percentage of vehicles, photo optics and medical equipment, and chemical products with high added value will substantially grow.

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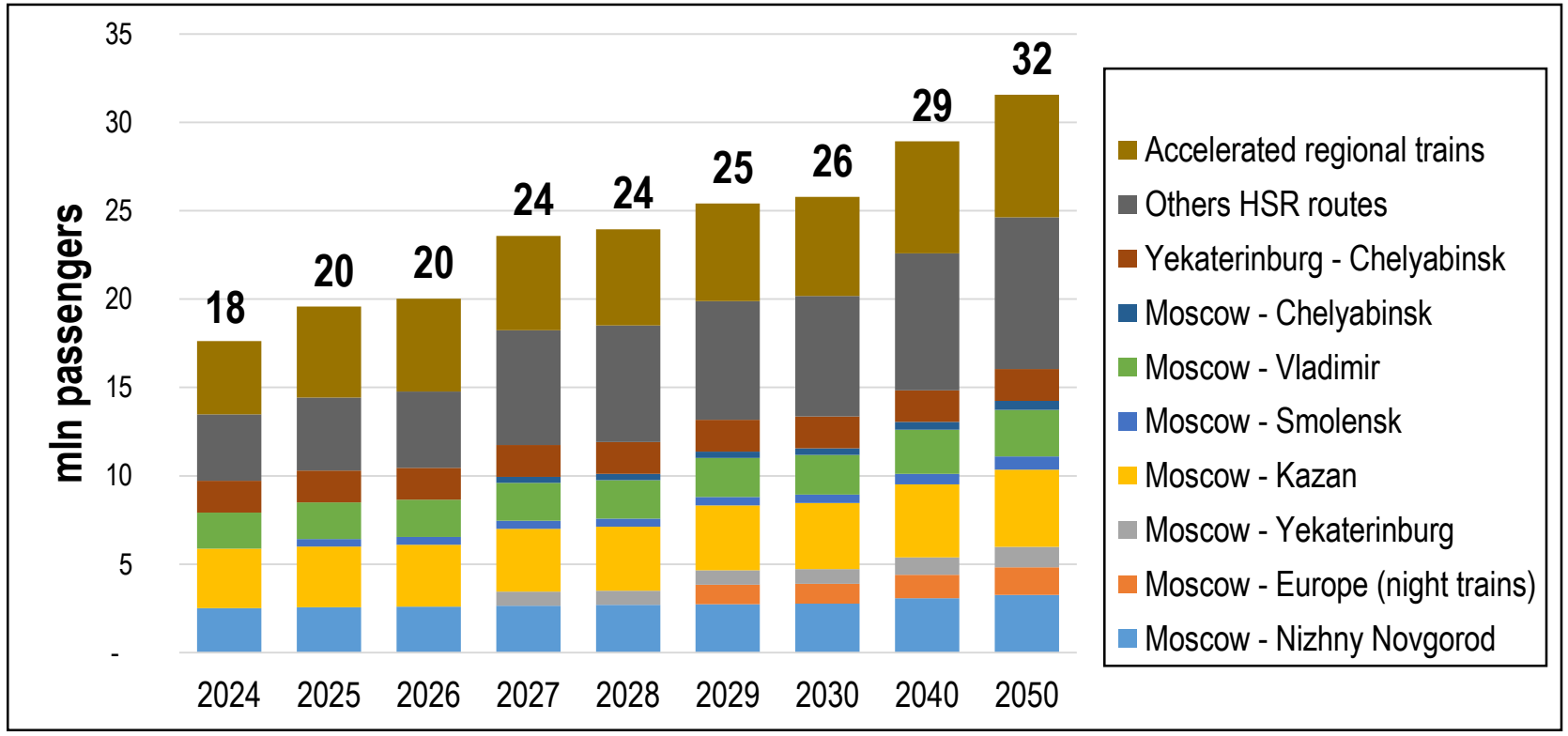
Passenger traffic of HSR «Eurasia» can reach about 20,5 mln passengers to 2030

The main directions of passenger transportation of HSR «Eurasia» will be Moscow – Nizhny Novgorod, Moscow – Kazan and Moscow – Vladimir. The largest passenger traffic will be between the largest cities, the distances between which are less than 1000 km. Passenger traffic is need in the additional evaluation of the routes within EU and routes between China and Kazakhstan.



China railway eryuan engineering group (CREEG) has provided more optimistic forecast of passenger traffic of HSR «Eurasia» - 57.92 million people to 2030 and 89.4 million people to 2050. But they took into account passenger traffic within the EU.

Source: calculations of IEC and MosGiproTrans

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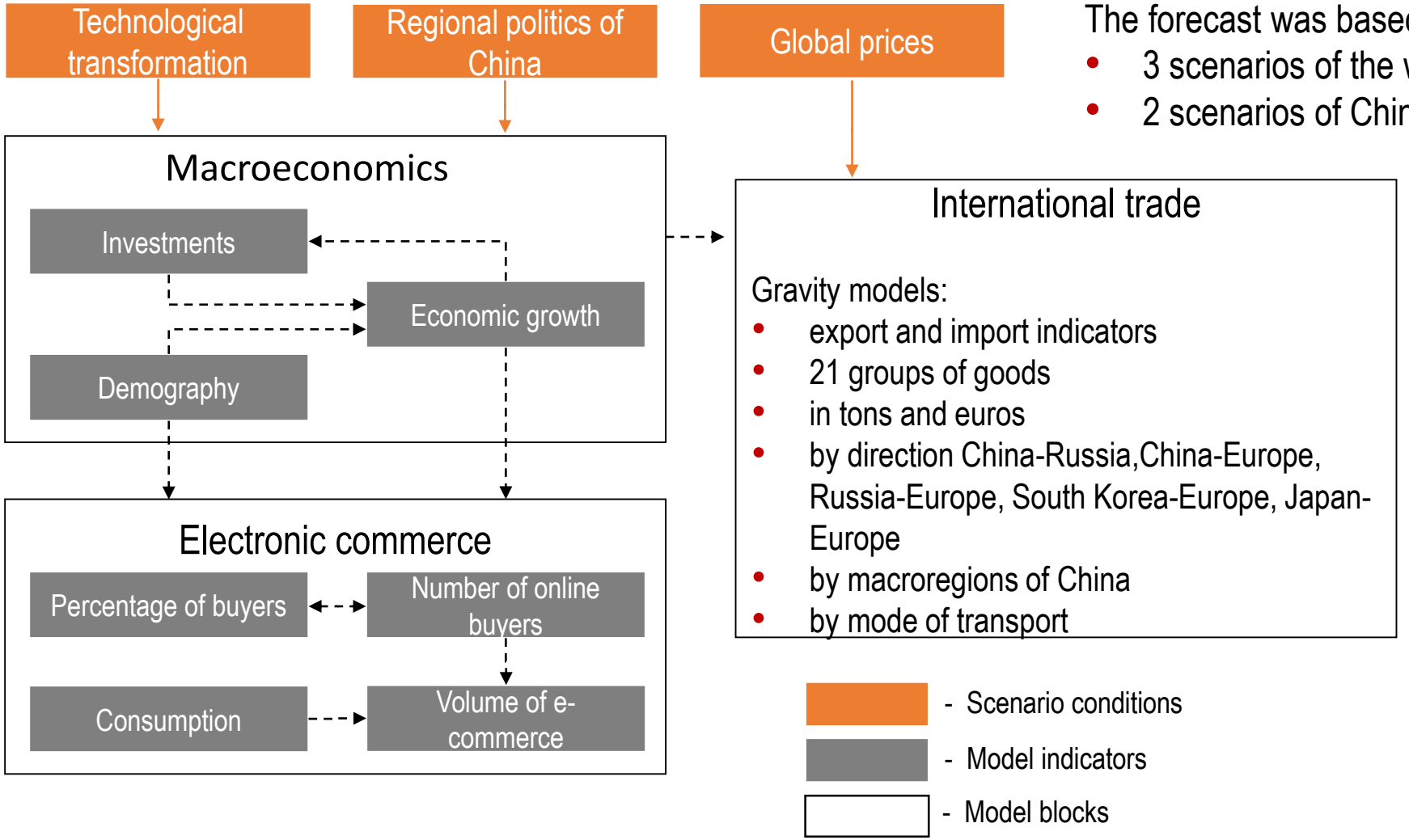
Model forecasting of international trade in the zone of influence of the corridor «Eurasia»

The generalized scheme of the calculation model



The forecast was based on 6 scenarios until 2050 :

- 3 scenarios of the world economy development
- 2 scenarios of China's spatial development

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FORECASTING METHODOLOGY FOR FREIGHT TFAFFIC OF «EURASIA»

Several indicators were used for forecasting:

- Current distribution of freight traffic of the 14 product groups between China and EU by mode of transport;
- Trade forecast of 14 product groups to 2050;
- General transportation costs for 14 product group by mode of transport.

General transportation costs = tariff +inventory costs («frozen» capital)

Thus, according to the general transport costs and the current transport structure by mode of transport for each group of goods, elasticity can be calculated and modeled for high-speed railway «Eurasia», which has the basic parameters of the tariff and travel time.

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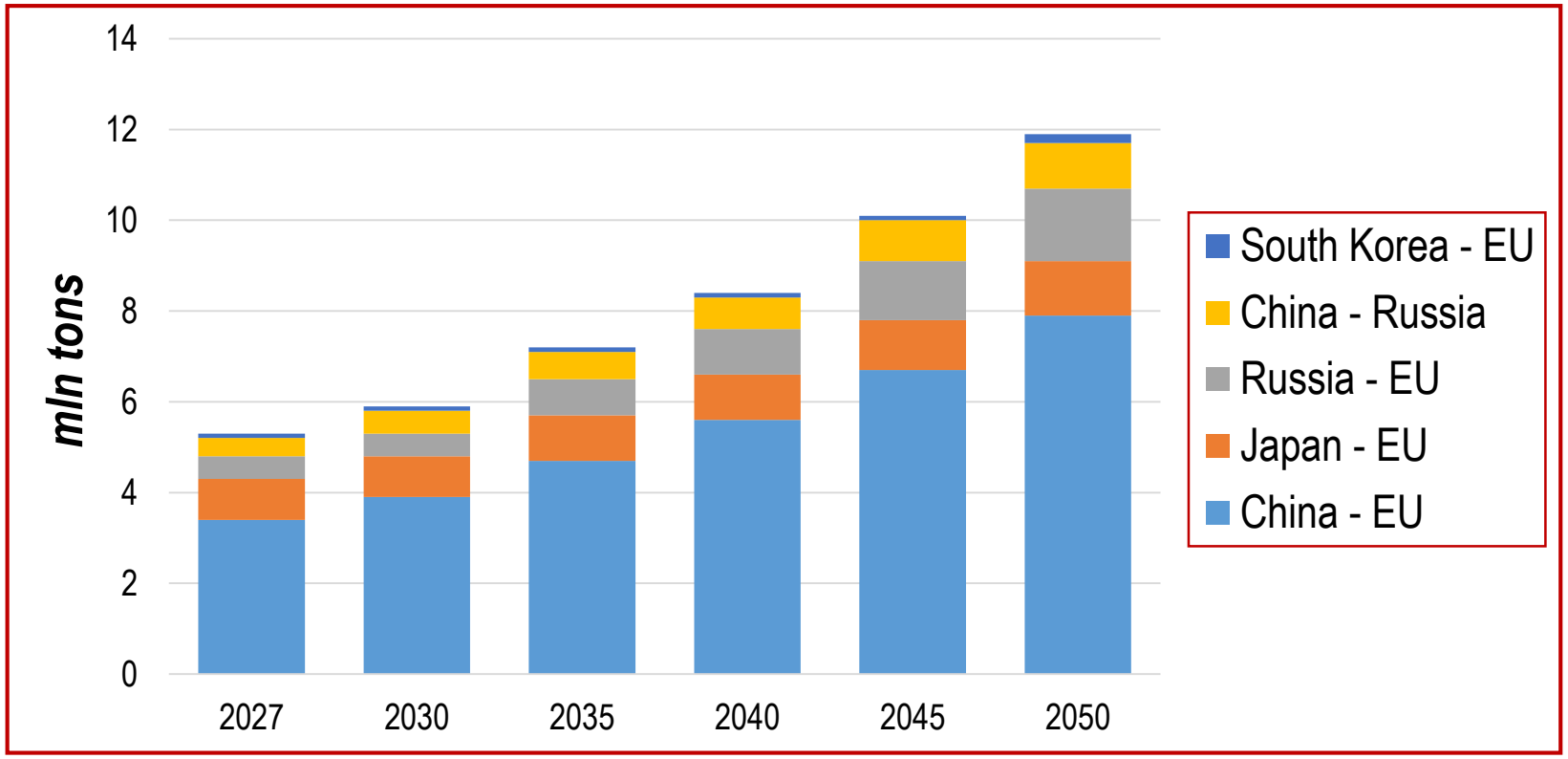
FREIGHT TRAFFIC OF HSR «EURASIA» MAY BE INCREASED WITH 5,3 MLN TONS IN 2027 TO 11,8 MLN TONS IN 2050

The main direction of freight traffic of HSR «Eurasia» will be China – EU which will be 2/3 of total freight transportation. One of the main prerequisites for construction the corridor «Eurasia» is the growth of trade in goods with a high added value between the EU and China.



Specialists of CREEG have calculated that the freight traffic between the countries and within the countries of HSR «Eurasia» will amount to 7.01 million tons in 2030; 10.59 million tons in 2040 and 15 million tons in 2050.

Source: calculations of PwC

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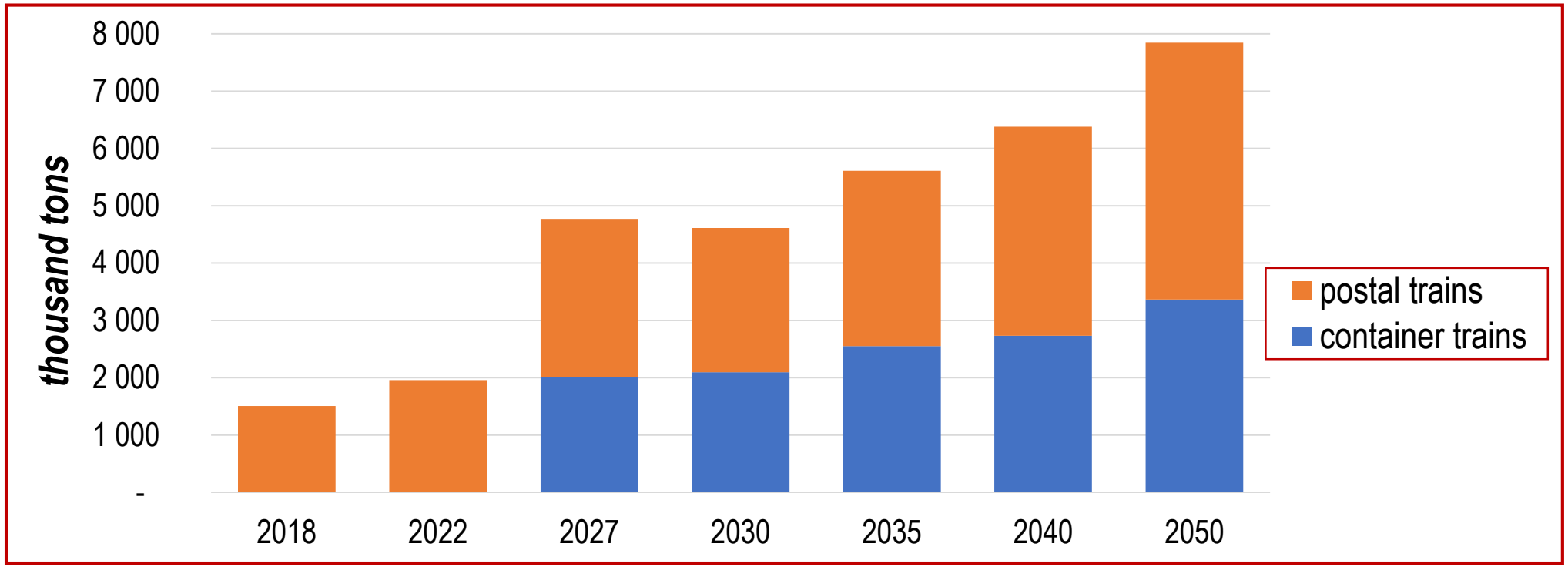
FREIGHT TRAFFIC OF POSTAL AND CONTAINER TRAINS THROUGH ZABAIKALSK CAN REACH ABOUT 4,8 MLN TONS IN 2027

Container trains will use the existing infrastructure through Zabaikalsk after commissioning of HSR «Eurasia» in 2026. The Trans-Siberian Railway can obtain a rather large flow of international trade goods, but it is necessary to carry out measures for modernizing the infrastructure.



Source: calculations of IEC

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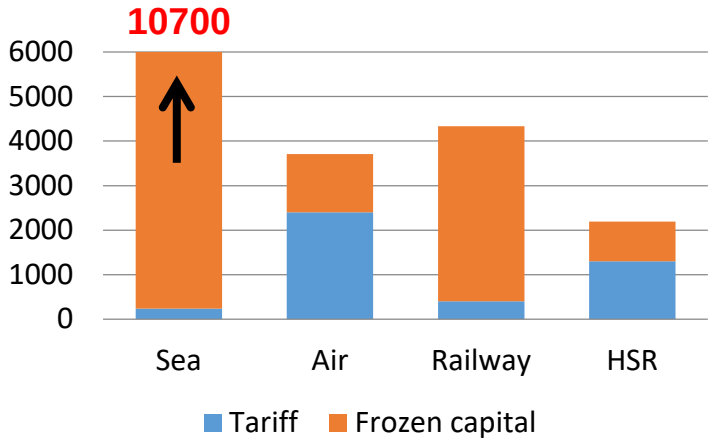
General transportation costs: the indicator of competitiveness

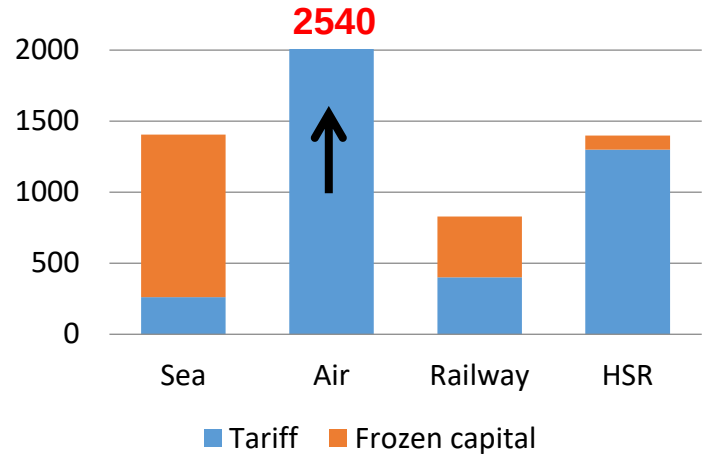
General transportation costs = tariff +inventory costs («frozen» capital)

IPhone 7



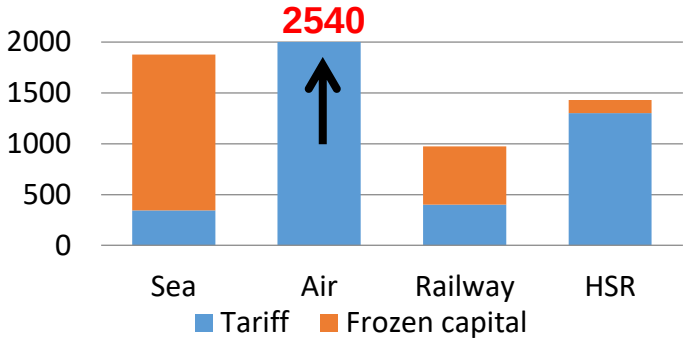
For the transport of expensive electronics, “classic” rail falls behind air transport. High-speed rail in this sector occupies the leading position.

Brand clothes



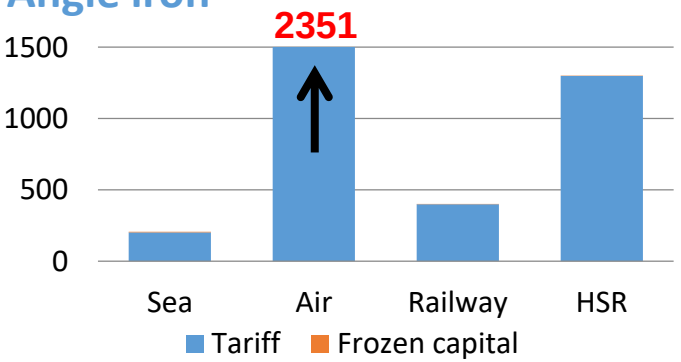
When the necessary conditions are met for transport, high-speed railway can compete with sea shipping in the brand clothing sector

Electronics for cars



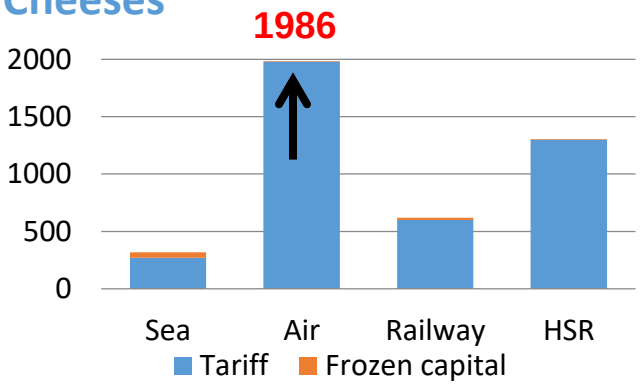
For the transport of automobiles and automobile components, ‘classic’ rail can also be competitive with sea shipping

Angle iron



For the transport of metal construction materials neither classic rail nor high-speed rail can compete with sea shipping

Cheeses



In the transport of food stuffs, high-speed rail can only compete with air transport

Source: research performed by IEC

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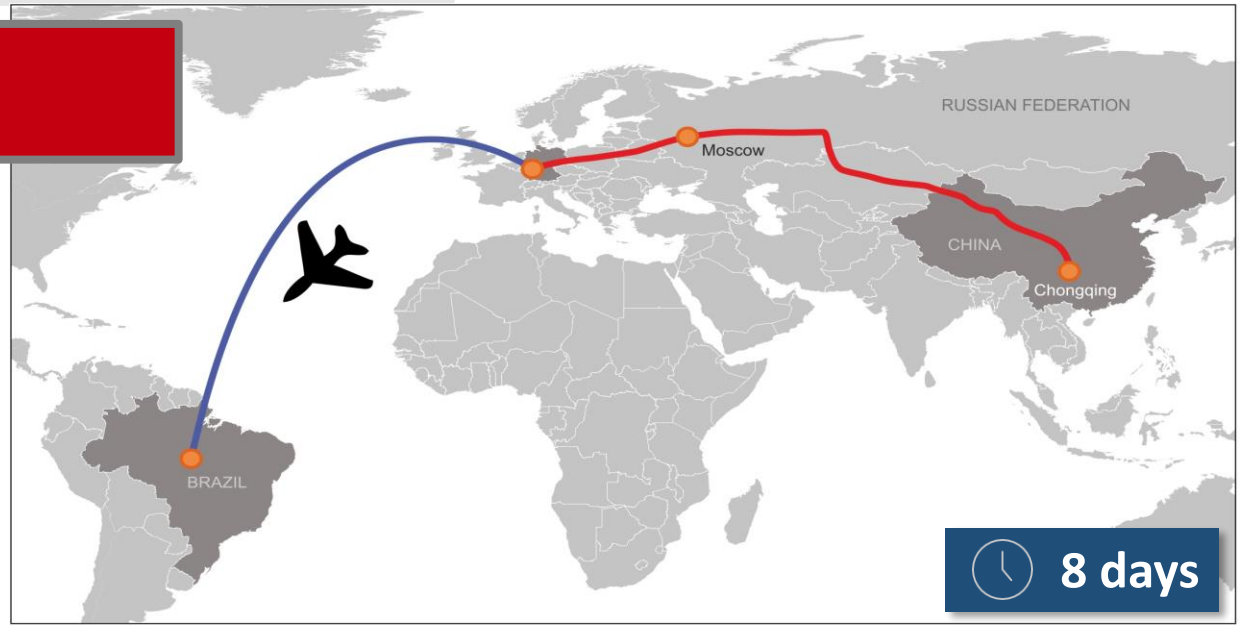
Other global trade routes which can include HSR «Eurasia» can enhance growth of European trade

Routes

CHINA – BRAZIL



INDIA – EUROPE

HARBIN – IRAN

KOREA – EUROPE, KOREA – IRAN

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Necessary conditions for long-term future growth in rail transit

According to interviews conducted with freighting and shipping companies

1. Provision of basic conveniences , the absence of which causes freighters to turn down the benefits of rail transport, such as optimal correlation of prices and delivery times

Transparency

- One window of control for the entire freighting process
- Simplification of tariff system
- Electronic documentation

Reliability

- Trains which follow tight schedules and accurately
- Online monitoring of the condition of the freight. Monitoring of the terms of transportation. Ability to inform the client of the status of transit online

Diversity

- Diversity of the types of containers- shipping containers, refrigerated, isothermal, air and sea containers
- Diversity of services (mail/ freight, from door to door, between stations, 4PL, etc.)

2. Active communicable politics directed towards promoting rail as an optimal alternative to other forms of transport, considering joint transportation expenditures for freight handlers

Now logistics companies do not offer transit by rail, as they do not assess customer costs, associated with negotiable lending

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One window- implementation of freight transport between EU, Russia, Central Asia and China

Initiative

Formation of a international consortium for organizing container-based (and potentially high-speed) freight transit, transparent tariff on freight, and the provision of accelerated, punctual train traffic.

- RZD
- Belarusian railways
- Chinese railways
- DB
- Polish railways
- SNCF
- KTZ

→ United supplier of scheduled rail freight services

This analogous initiative is proposed within the limits of the Central Asian (CAREC) corridors under the auspices of the Asian Bank of Development

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The total capital expenditure on the project makes 7.08 trillion rubles for the Brest-Dostyk section

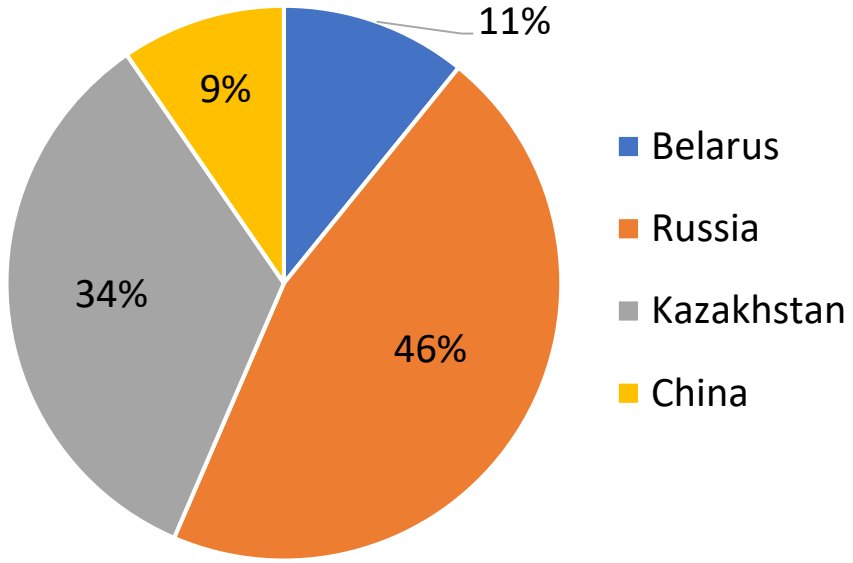
7.84 trillion rubles, taking into account China

Cost of the main construction projects of the railway line, trillion rubles

	Belarus	Russia	Kazakhstan
Earth bed	0,12	0,46	0,34
Artificial structures	0,35	1,53	1,36
Track bed structure	0,1	0,39	0,28
Objects of supplementary and maintaining purpose	0,04	0,18	0,11
Power facilities	0,08	0,33	0,16
Objects of transport facilities and communication	0,08	0,32	0,2
External networks	0,03	0,14	0,08
Landscaping and gardening of the territory	0,05	0,22	0,14
TOTAL, trillion rubles without VAT in the prices of 2Q 2017	**0,85**	**3,58**	**2,66**

Source: calculations of PwC

CAPEX,%



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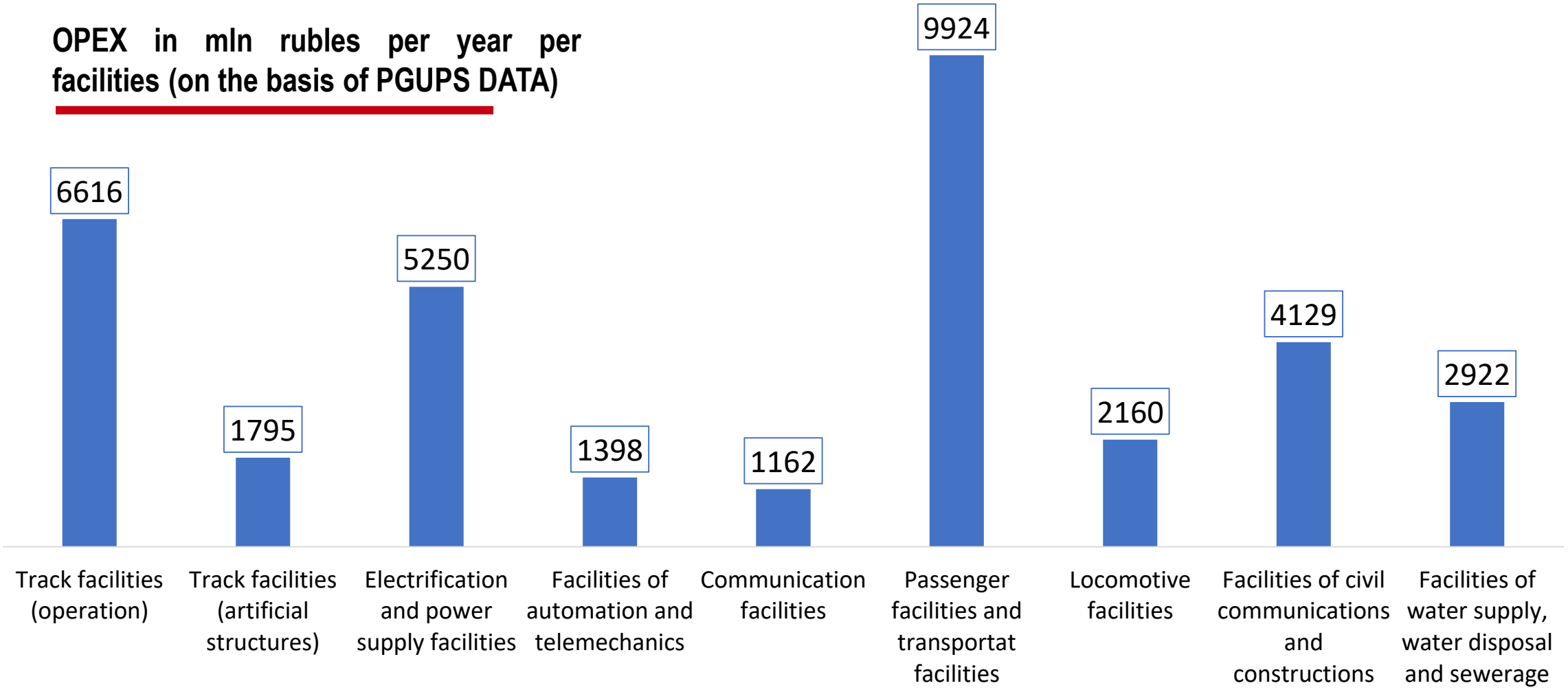
Operating expenses for the maintenance of the infrastructure of the HSR «Eurasia»

50 million rubles per 1 km per year

OPEX in mln rubles per year per facilities (on the basis of PGUPS DATA)



Source: calculations of PwC

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Key prerequisites and indicators of economic efficiency of the project

Base scenario

Key Prerequisites

Senior debt,%	60%
Equity financing,%	40%
Discount rate (WACC),%	4,2%
Discount rate on equity (CAMP),%	3,5%
Property tax (privilege till 2050),%	0%
Cost of the senior debt,%	5,8%
Number of cargo trains, units	145
Number of passenger trains, units	68
Rate of return, % for the operator of the infrastructure	2%
Capital expenditures, trillion rubles in the prices of 2017	7
Inflation capital costs, trillion rubles	9,2

Indicators of economic efficiency of the Project

NPV of the Project, trillions rub.	25,8
IRR of the Project, %	5,2
PBP of the Project, years	23,6

Source: calculations of PwC

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Methodology and approaches to the calculation of socio-economic effects

General effects

Direct effects

- Increase in revenue from traffic volume growth
- Reduction of the need for investment in existing infrastructure
- Optimization of the load level of existing infrastructure

Effects of investment demand

- Growth of economy due to reduction of travel time to world markets
- Growth of production and investments
- Implementation of new technologies
- Growth of budget revenues and GDP

Agglomerative effects

- Saving of travel time
- Increase in population mobility
- Increase in transport accessibility
- Growth of labor market and market of goods and services
- Growth of housing cost

Other effects

- Improvement of environmental situation
- Increased transportation safety
- Increase in competitiveness of railway transport

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