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Resilience of the Transport System to External and Internal Shocks

The transport sector of Belarus is a complex structure characterized by a large number of actors, a diversity of rules and regulations, varying degrees of regulation depending on the mode of transport, and a sophisticated system of sector governance.

The resilience of the transport system and its ability to rapidly adapt to external and internal shocks is a critical factor for economic and social stability, as well as a foundation for economic development and improved mobility of the population. The stable functioning of the various elements of the transport system directly affects people's quality of life, their ability to support themselves and their families financially (by being able to commute to work and earn a living), materially (access to goods required in different life situations), and in terms of access to essential daily or emergency services.

In this paper, based on an analysis of the current state of Belarus's transport system, potential internal and external shocks are examined, the most dangerous among them are identified, and measures are formulated to help overcome these shocks and minimize their possible consequences.

Across the territory of Belarus, the main volumes of freight transportation are carried out using the existing transport infrastructure by road, rail, river, and pipeline transport. Electric transport and air transport account for only negligible volumes of freight (individual or experimental consignments).

Mass transportation of passengers within the country is carried out using road transport, urban electric transport, and rail transport.

In 2020, for the first time, public authorities developed comprehensive state programs that defined specific development directions for individual aspects of the transport sector. These programs analyzed potential risks related to non-implementation of program elements, proposed methodologies for assessing implementation effectiveness, identified organizations responsible for implementation, assigned specific areas of activity to executing organizations, and defined funding volumes and sources for each direction.

The measures outlined in these documents adequately reflected the state of the transport sector as of 2020 and presented a positive vision for sector development up to 2025. An analysis of changes introduced into these comprehensive documents during the period from 2021 to 2025 shows that the developers

adequately understood the evolving economic and political situation in the country (with adjustments made to funding sources and volumes, as well as timelines for achieving target indicators). At the same time, the originally defined goals, objectives, and measures up to 2025 were preserved.

The market for international freight and passenger transport has successfully adapted to operating under sanctions. Sanctions pressure directed at the Government of Belarus has had a greater impact on the population of the country. The state has adapted to the new conditions by intensifying integration processes with Russia (Figure 1).

Figure 1 – Freight transport market according to the ati.su study

The existing sanctions, in addition to their impact on the Belarusian economy and politics, have contributed to deeper integration of the Belarusian economy into the Russian one, which in turn has led to a further strengthening of dependence on Russia. While sanctions affect commercial transport across the EU border, they have a greater impact on private cross-border mobility.

For residents of Belarus, Russia has become more accessible (for tourism and joint business activities), which automatically leads to a broader influence of Russian narratives on Belarusian society and a declining interest in European values, partly due to their reduced accessibility, including in transport terms.

Sanctions have complicated and made international freight transport more expensive, but they have not stopped it. The restructuring of logistics chains has led to longer delivery times and higher prices for imported goods in Belarus. Sanctioned goods continue to be delivered to Belarus, and goods from Belarus that are subject to sanctions still reach foreign consumers, although via longer (and therefore more expensive) routes.

International passenger transport routes between Belarus and Europe have become more expensive and time-consuming. Cheap and fast cross-border mobility options (on foot, by bicycle) have been eliminated. Efforts by European neighboring governments to combat smuggling and potential agents from Belarus in this way appear to be populist and ineffective, while significantly complicating the lives of the most active segments of Belarusian society.

In domestic transport operations, the following developments have taken place:

- Expansion of the use of vehicles with electric propulsion;
- Gradual but quantitatively significant renewal of passenger transport rolling stock across most of the country;
- Introduction of new fare payment methods in almost all cities;
- Strengthening of oversight over legal entities engaged in freight and passenger transport;
- Deterioration of passenger travel conditions across all modes, combined with rising fares in irregular and non-urban services;
- Bankruptcy of JSC “Belarusian Shipping Company”.

Governance of railway transport (freight and passenger), road transport (freight and passenger), as well as urban electric transport and the metro system is exercised by the President of the Republic of Belarus, the Council of Ministers of the Republic of Belarus, the Ministry of Transport and Communications of the Republic of Belarus, local executive committees, and passenger transport operators.

The transport governance system in the country is relatively complex and varies significantly depending on the transport mode and type of service being regulated.

There are a number of organizations that are formally joint-stock companies, but de facto almost all shares in these companies are owned by the Ministry of Transport.

Given the structure of governance in the transport sector, there is a strong incentive at the government and line ministry levels to focus on transport activities that generate direct revenue (freight transport by all modes, air transport, railway operations). Responsibility for the functioning of socially subsidized passenger transport is effectively delegated to local executive committees. These, in turn, delegate operational responsibilities to state-owned organizations that act as operators of regular passenger services.

A distinct governance architecture and, in some respects, a unique status apply to the Republican Unitary Enterprise **Belarusian Railway**.

The National Strategy for Sustainable Socio-Economic Development of the Republic of Belarus up to 2030 defines the objectives and directions for the

development of the national transport system and establishes criteria for assessing the achievement of these goals. The measures and objectives of the strategy have remained relevant as of 2025.

The quantitative targets set for the period from 2016 to 2030 were defined at fully achievable growth levels: a 20% increase in freight turnover and a 40% increase in passenger turnover.

Only four organizations operate nationwide in the water transport sector, while 18 organizations are active in aviation transport (the vast majority of which are engaged in freight transport). Nearly 9,000 organizations operate in the field of road passenger and freight transport.

Approximately 97% of legal entities engaged in transport activities are micro, small, and medium-sized enterprises, with 91% of these being micro-enterprises (Figure 3).

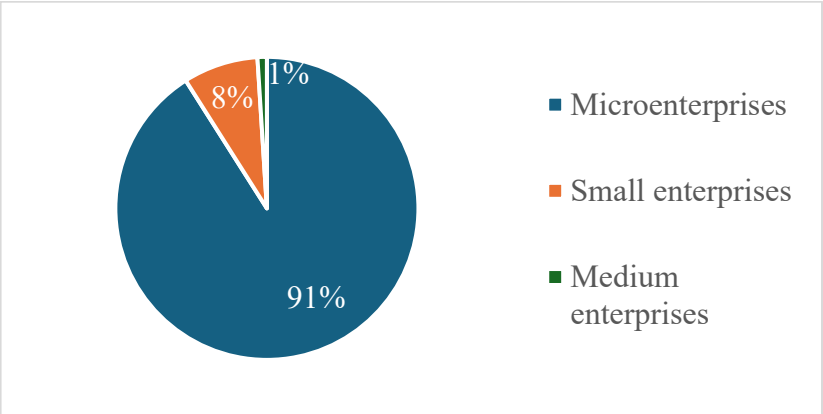

Figure 3 – Distribution of Transport Organizations by Size

The large number of freight vehicles and buses owned by private individuals (compared to similar figures for organizations) indicates that, as of 2023, around one third of commercial vehicles in the road transport market may be operating outside the scope of transport regulation (Figure 4).

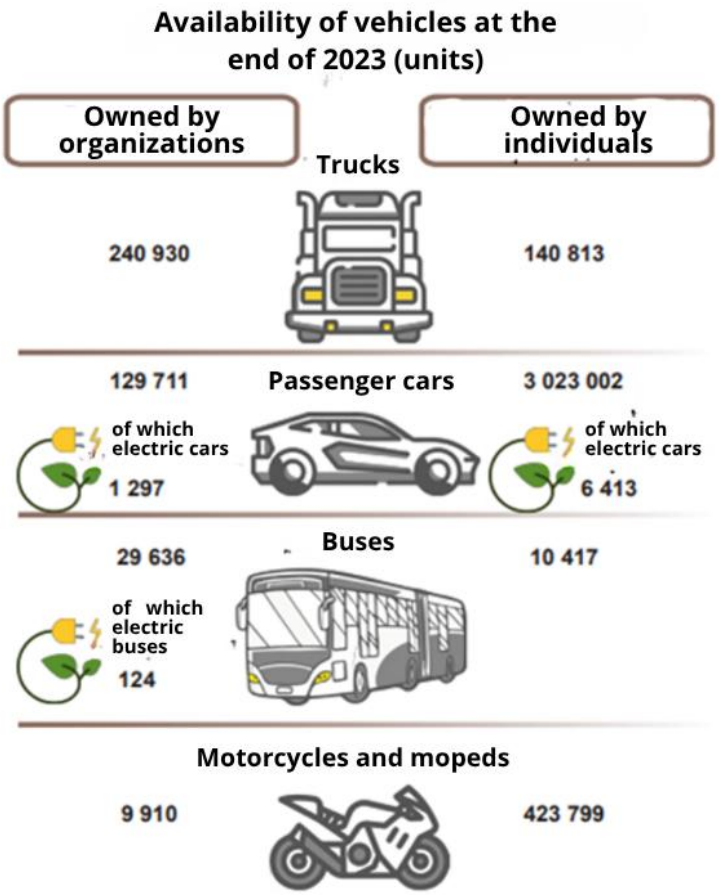

Figure 4 – Vehicles Owned by Individuals and Organizations

The transport services sector, including transport activities, warehousing, postal, and courier services, accounts for around 5% of Belarus's GDP.

Approximately 7% of the country's population is employed in the transport sector. Both the relative and absolute number of people employed in the sector has been steadily declining year by year. It is evident that since 2020 attempts have been made to address staffing challenges through wage increases. However, rising wages in the sector have led to higher household spending on transport services: in 2023, the share of consumer expenditures on transport services reached 10.9% (compared to 10.0% in 2018).

Sanctions pressure has, year after year, resulted in a growing imbalance between exports and imports of transport services. This indicates that in international transport to and from Belarus, Belarusian carriers are increasingly losing market share to foreign operators. This trend is detrimental to the stability of the sector and may become a constraint on economic development should the economic and political situation in Belarus change.

On average across the sector, labor costs account for slightly more than 30% of total costs (plus an additional 11% in social contributions) in the cost structure of transport organizations, while fuel costs amount to approximately 12%. Labor

costs have been gradually increasing each year, while the share of fuel costs has been declining.

The profitability of sold products, goods, works, and services of transport organizations stands at 8.5%, while the profitability of transport sales is 7.0%. Such low indicators point to low operational efficiency in the sector. A further decline in average profitability would indicate stagnation of the transport sector in the country.

The reduction in the number of loss-making organizations, combined with a decrease in the total number of legal entities in the transport sector, suggests that some organizations failed to adapt to the political and economic conditions that emerged in Belarus after 2020.

In 2024, the number of passengers transported in Belarus was 13.7% lower than in the pre-pandemic year of 2019 (Figure 5). At the same time, passenger turnover in 2024 reached 96.1% of the 2019 level (Figure 6).

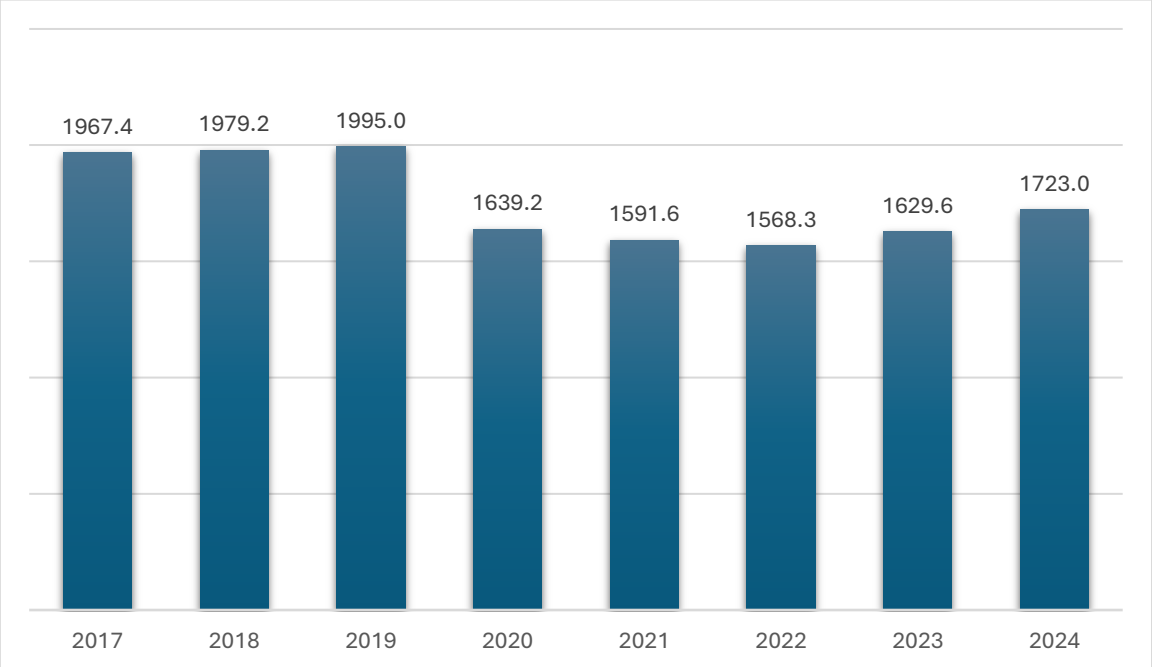

Figure 1 – Volume of passenger transportation by all modes of transport, million people

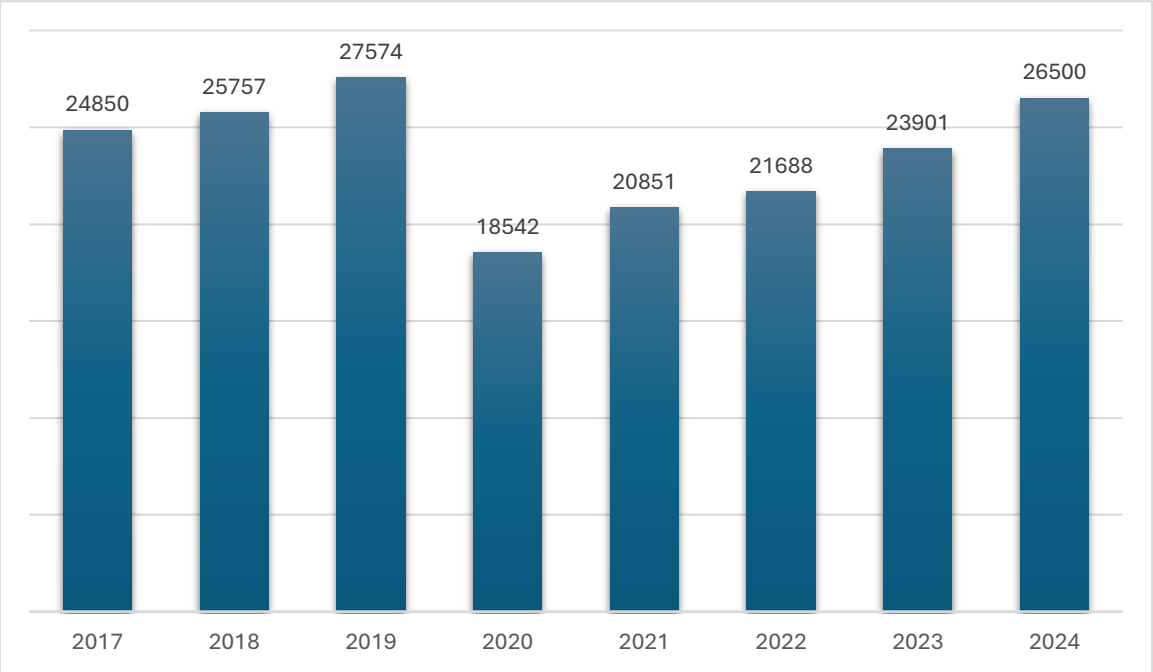

Figure 2 – Passenger turnover by all transport modes, million passenger-km

Sources of the relatively rapid recovery in demand for transport services cannot be clearly identified due to the lack of access to detailed transport statistics since 2022. The overall increase in passenger turnover combined with a simultaneous decrease in the number of passengers transported in the first post-pandemic years (2021–2022) may be linked to an increase in the number of vehicles operating on routes. In turn, this may have been done to reduce average vehicle occupancy levels in response to epidemiological conditions in the country. Subsequently, growth in passenger turnover may have been driven by an increase in transport volumes using higher-capacity modes, such as rail transport.

The structure of passenger transport volumes shows that road transport (buses and taxis) is the most in-demand mode for passenger transportation, accounting for more than half of all passengers in the country. The next most popular modes are urban electric transport and the metro, which together carry around one third of all passengers.

Since 2020, the state has declared objectives aimed at developing electric transport in Belarus. Overall demand for new types of electric passenger transport by 2025 has been defined (almost 2,500 units of trolleybuses with autonomous operation and electric buses). In three cities, buses on urban routes are being replaced by electric buses, and criteria for the economically efficient use of electric buses have been established. However, assessing the effectiveness of electric transport development measures over the past five years is difficult due to the absence of publicly available statistical data after 2021. The dynamics of changes in passenger volumes and passenger turnover from 2017 to 2021 indicate rather negative trends for electric transport, with declining indicators.

It is evident that cities are beginning to use electric transport development programs as a mechanism for the general renewal of public transport fleets. This represents a favorable opportunity for cities to obtain financing for updating passenger vehicles. However, in the medium term (up to 10 years), this approach may lead to the degradation of transport systems due to a lack of funds for the simultaneous replacement of energy storage systems in electric buses. Over a longer horizon (around 15 years), assuming the previous crisis is overcome, new problems may arise related to the need for a simultaneous full renewal of the entire vehicle fleet.

At the same time, in the absence of long-term planning strategies among public transport operators, any opportunity to renew rolling stock is perceived as positive by these organizations.

A rapid increase in the efficiency of taxi transportation is also observed. With strengthened regulation of taxi services, infrastructure development for this mode of transport has effectively stalled. The demonopolization of the taxi market is expected to take place during 2025.

Prices for public passenger transport services have increased annually from 2018 to 2023. However, in four of the six years under review, annual price growth rates were lower than the national inflation rate. Given that fares for the most common types of transport services (urban and suburban connections) are set by the Ministry of Antimonopoly Regulation and Trade in cooperation with local executive committees, it can be concluded that the government takes a very cautious approach to increasing public transport fares. This is likely due to the large number of users of this sector and the high social sensitivity to sharp changes in the cost of a socially important service such as public passenger transport.

The policy of restraining fare growth has led to a significant decline in cost recovery. The average cost recovery level of public transport in the country decreased from 81% in 2017 to 29% in 2025. The sharp decline in cost recovery occurred during 2023–2024, which may be associated with high inflation amid unchanged fares, as well as other local factors specific to the operation of certain transport modes. The number of passengers eligible for fare concessions (for example, 0.25% of total passengers in Minsk) and fare control systems (with detected fare evasion rates of 0.02–0.03%) do not have a significant impact on public transport cost recovery. The gap between actual operating costs and revenues from passenger transport services is covered by non-core activities of transport operators and budget subsidies.

According to available data, electric transport demonstrates the lowest level of cost recovery. This is due to the fact that the cost structure of electric transport includes the maintenance of its dedicated infrastructure, whereas the cost of road transport

operation does not include the cost of maintaining roads in a condition suitable for bus traffic.

As for freight transport, cargo volumes in Belarus increased steadily up to 2018. Since 2019 (based on available statistics), freight volumes have been declining each year. This trend may be associated both with the COVID-19 pandemic and with political developments in Belarus. In 2021 (after which data are no longer published), the annual indicator was almost 15.5% lower than in 2018, which marked the beginning of the decline in freight transport volumes (Figure 7).

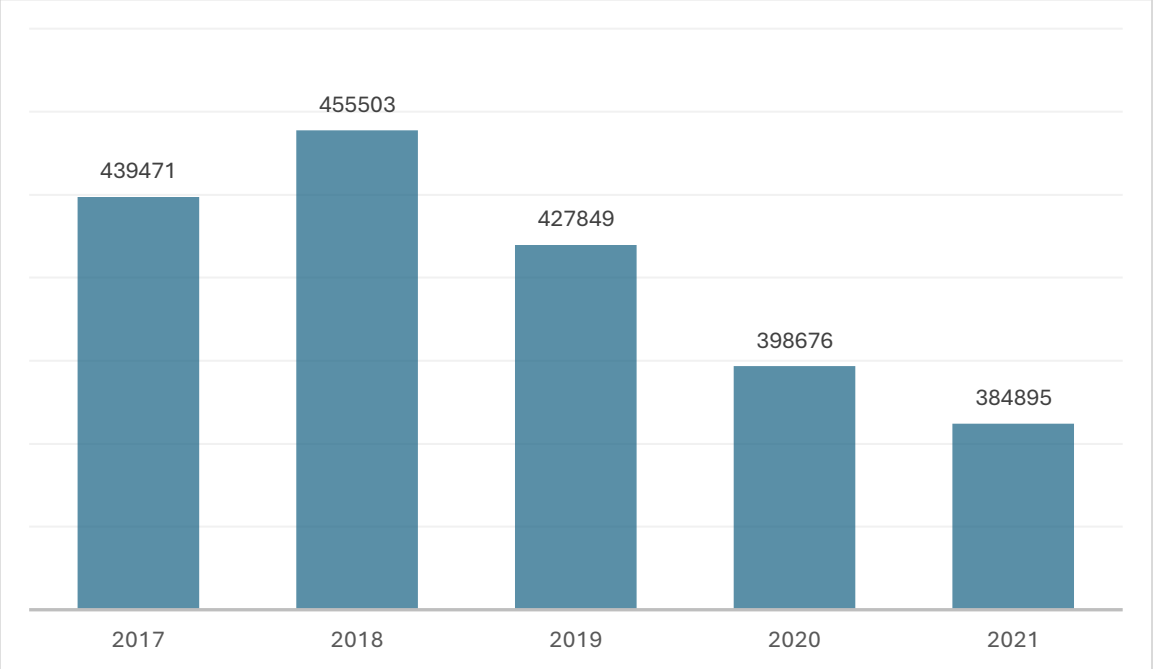

Figure 7 – Volume of Freight Transported by All Modes of Transport, million tonnes

Overall, across the freight transport sector, freight turnover continued to show a downward trend starting from 2019, with only a slight increase observed in 2024 (Figure 8).

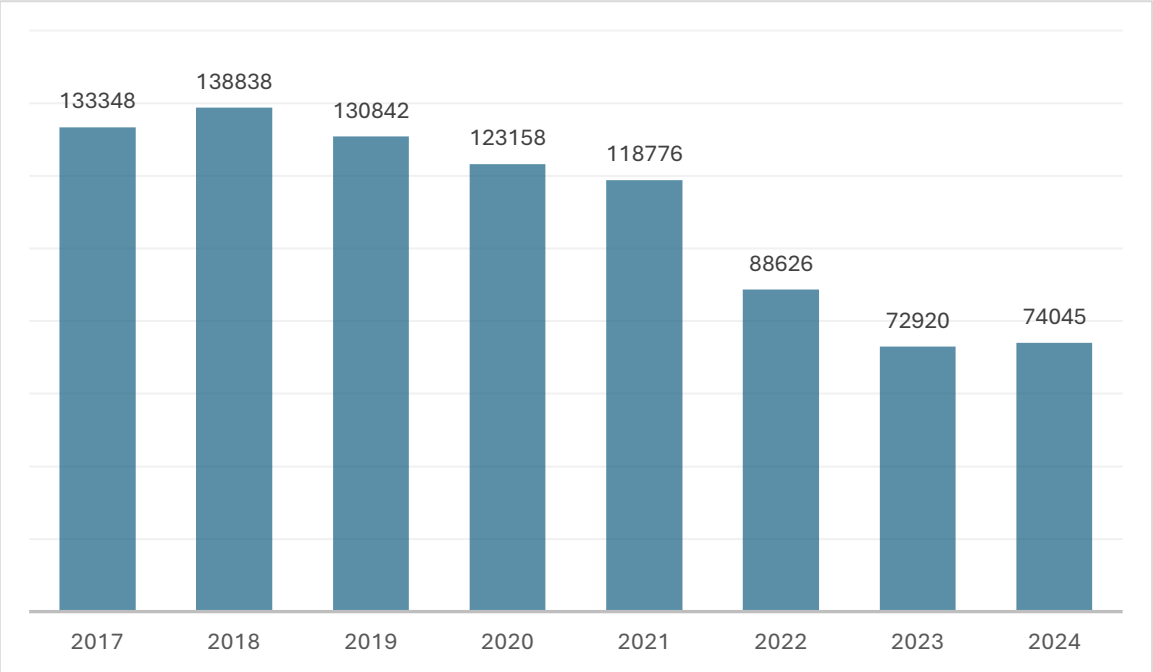

Figure 8 – Freight Turnover of All Modes of Transport and Road Transport Separately, million tonne-kilometres

Seventy percent of total freight turnover across all modes of transport in the country is carried by rail. At the same time, the share of domestic freight transported by rail in the total volume of rail freight does not exceed 20% in any given year.

Since 2023, a growing imbalance between export and import freight transport has been observed: the number of orders for import transport to Belarus in 2024 increased by more than 50% compared to 2023, while growth in export transport has nearly stalled (only a +3% increase in the number of orders over the same period).

The majority of road freight transport orders to Belarus originate from Russia, China, and Kazakhstan. At the same time, in 2024 an increase was also observed in orders for transport from Poland, Lithuania, the Netherlands, Georgia, and Kyrgyzstan. The main destinations for freight transport from Belarus are Russia, Kazakhstan, and Poland. Overall, the freight transport market reflects a strong dependence of the Belarusian economy on Russia.

The sustained growth in the number of transport orders to and from Russia may be linked to the re-export of Russian goods in order to bypass European Union sanctions. Indirectly, this assumption may also be supported by the recovery of demand for transport services toward Europe under sanction conditions.

Despite sanctions, **Belarusian Railway** continues to utilize its transit potential as part of the international railway network: container train routes passing through Belarusian Railways operate 26 times per week from China to Europe and 21 times per week from Europe to China.

Since the 2010s, Belarus has made attempts to conceptualize urban mobility management. During the same period, within the framework of international projects, a number of documents were developed for selected Belarusian cities, outlining measures for the development and implementation of pilot Sustainable Urban Mobility Plans (SUMPs) up to 2025. However, no publicly available information has been found regarding either the development or the intention to develop pilot SUMPs for cities with populations exceeding 30,000.

To analyze potential threats, the PESTEL approach was applied, which involves analyzing factors across six dimensions: political, economic, social, technological, environmental, and legal (from the initial letters of the English terms Political, Economic, Social, Technological, Environmental, Legal).

The economy of the country was identified as the global object of internal shocks, or more specifically:

- people who use freight and/or passenger transport services;
- all organizations that rely on transport powered by internal combustion engines to support any aspect of their activities.

It was determined that the following entities in the country are vulnerable to internal shocks affecting the transport sector:

- passenger transport operators;
- passenger transport companies;
- freight carriers;
- Belarusian Railways.

All of the above entities, with the exception of passenger transport operators, are also exposed to external shocks. Some internal and external shocks affect the transport sector as a whole rather than individual entities.

Internal shocks

Internal shocks in the passenger transport sector are associated with the inability of the socially subsidized regular transport system to function properly due to insufficient or fully withdrawn subsidies for public transport operations. At present, subsidies are paid to state-owned passenger carriers in the form of transfers from city or regional budgets and/or from revenues generated by other activities of transport organizations, such as freight transport or the provision of other, seemingly non-core services.

In the freight transport sector, internal shocks may arise in the event of nationwide fuel supply disruptions.

A common internal shock for the entire transport sector may be the aggravation of personnel shortages among those involved in passenger and freight transport operations.

Additional internal shocks are associated with the transport sector's capacity for adaptation.

The following internal shocks are identified as common to the transport sector as a whole:

1. **Organizational, technical, or technological shocks:**

- personnel shortages in the transport sector;
- fuel shortages;
- shortages of spare parts for the repair of freight and passenger vehicles.

2. **Political and economic shocks:**

- sharp increases in fuel prices due to failures in fuel supply agreements with Russia;
- imposition of martial law.

Internal shocks specific to road freight transport

1. **Organizational, technical, or technological shocks:**

- shortage of freight vehicle drivers;
- shortage of transport vehicles;
- military attacks on freight transport enterprises;
- military attacks on logistics centers and hubs;
- cyberattacks on the technological infrastructure of freight forwarding companies and carriers.

2. **Political and economic shocks:**

- nationalization of private freight transport businesses.

Internal shocks specific to road passenger transport

1. **Organizational, technical, or technological shocks:**

- shortage of passenger transport drivers;
- loss of specialists capable of effectively managing the passenger transport sector;
- insufficient number of vehicles for regular route operations;
- bankruptcy of private carriers;

- changes in modal split of urban travel;
- operation of transport strictly at minimum social standards.

2. **Political and economic shocks:**

- nationalization of private passenger transport businesses;
- rising costs of regular passenger transport combined with declining subsidy volumes;
- state monopolization of the regular passenger transport market;
- sharp increases in refinancing rates, problems with leasing payments by passenger carriers, leading to aging of the passenger transport fleet in Belarus.

Internal shocks in railway transport

1. **Organizational, technical, or technological shocks:**

- cancellation of passenger rail services;
- withdrawal of passenger rolling stock from service due to natural wear;
- shortage of wagons to meet required transport volumes;
- decline in transport volumes and loss of personnel;
- outdated and inefficient management incapable of making adequate decisions;
- loss of passenger transport market share to other modes and/or foreign carriers;
- technological backwardness;
- reduction of railway network length due to inability to maintain track infrastructure in proper technical condition.

2. **Political and economic shocks:**

- loss of competitiveness of Belarusian Railways in an open market;
- non-core assets leading Belarusian Railways toward bankruptcy;
- staff departures due to social tensions caused by deteriorating working conditions and declining wages;
- transfer of the railway monopoly from the state to a Russian-owned enterprise;
- lack of investment for the development of Belarusian Railways.

External shocks

External shocks affecting the functioning of the Belarusian transport sector are associated with potential disruptions of transport links with neighboring countries: changes in the operation of border crossings, reductions in freight transit volumes through Belarus, and restrictions on freight and/or passenger transport.

Additional external shocks include access to imported energy resources and changes in their prices, access to foreign technological solutions for transport management, and the maintenance of foreign technical solutions already implemented in Belarus.

The following external shocks are identified as common to the transport sector:

1. **Restrictions on export, import, and/or transit of goods:**

- closure of all border crossings with EU countries;
- new restrictions on the operation of EU border crossings;
- changes in border crossing procedures between Belarus and Russia;
- failure to reopen border crossings with Ukraine after the end of the Russia–Ukraine war;
- transport isolation of the country (closure of all border crossings for freight transport).

2. **Political and economic shocks:**

- new sanctions targeting Belarusian goods and/or carriers;
- introduction of martial law across large areas of Russia;
- absorption of Belarus by Russia;
- suspension or significant reduction of fuel supplies from Russia to Belarus.

As with internal shocks, a separate set of external shocks was identified for each group of entities.

External shocks specific to road freight transport

1. **Political and economic shocks:**

- dumping of Belarusian freight carriers by Russian carriers if cabotage transport is permitted;
- cancellation of agreements between Belarus and Russia providing preferential conditions for Belarusian carriers operating in the Russian direction.

2. **Organizational, technical, or technological shocks:**

- lack of readiness or absence of transport and logistics infrastructure to increase freight flows;
- EU bans on the sale of commercial freight vehicles to Belarusian companies, leading to aging vehicle fleets;
- reduction in the number of permits issued for Belarusian carriers to operate in EU countries;

- additional incentives for hiring professional drivers from Belarus in EU countries, including more attractive relocation conditions for families.

External shocks specific to road passenger transport

1. **Political and economic shocks:**

- dumping of Belarusian passenger carriers by Russian companies in international transport;
- cancellation of preferential agreements for Belarusian carriers operating toward Russia;
- intervention of large Russian companies in the Belarusian passenger transport market and monopolization by Russian firms;
- introduction of additional technical requirements for international passenger vehicles that Belarusian carriers are unprepared to meet;
- bans on importing tourist-class buses;
- bans on importing bus components not produced in Belarus.

2. **Organizational, technical, or technological shocks:**

- aging vehicle fleets of Belarusian companies operating international routes toward the EU;
- emergence of foreign low-cost bus operators;
- reduction in the number of international passenger routes toward the EU at the initiative of EU transport regulators;
- additional incentives for hiring Belarusian drivers in EU countries, facilitating permanent relocation with families.

External shocks in railway transport

1. **Political and economic shocks:**

- exclusion of Belarusian railways from East–West freight transit;
- reduced demand for transport between Russia and the EU;
- increased tariffs for transporting Belarusian goods over Russian railway infrastructure;
- prolonged process of lifting EU sanctions and re-diversifying transport away from the Russian direction;
- sale of Belarusian Railways to Russia;
- suspension of passenger rail services toward Russia.

2. **Organizational, technical, or technological shocks:**

- lack of readiness or absence of logistics infrastructure to increase freight flows;

- restrictions or bans on the supply of components from Russia for rolling stock maintenance and repair;
- bans on operation or withdrawal of support for software systems such as ASU Express, SAP, and microprocessor-based interlocking systems;
- inability to procure new locomotives from abroad;
- reduction in permitted volumes for running Belarusian wagons on Russian railway infrastructure;
- need for a rapid transition to European standards in the event of isolation from Russia.

Shock assessment criteria

Each shock was assessed using the following indicator:

Probability – the likelihood and feasibility of the shock occurring:

- **Very high (3)** – the shock may occur within the next 5 years or occurs approximately every 5 years;
- **High (2)** – the shock may occur within the next 10 years or has occurred within the past 10 years;
- **Medium (1)** – the shock has not occurred system-wide in Belarus, has occurred only at the level of individual organizations, or has occurred in other countries;
- **Low (0)** – the shock is unlikely but potentially possible.

Vulnerability – the extent to which a shock can affect the normal functioning of transport systems

- **Very high (3)** – the vulnerable subject is a single state-owned enterprise or organization operating within one major administrative-territorial unit (the country as a whole, one of the regions, or the city of Minsk) and performs the largest share or the entirety of its core activities within that territory; is dependent on budgetary support; is subordinate to regional executive committees (or the Minsk City Executive Committee), or is managed with the involvement of the Ministry of Transport and Communications; or the shock affects the activities of all transport operators without exception.
- **High (2)** – the vulnerable subjects are multiple enterprises, organizations, or their branches located within an administrative-territorial unit at the district or city level; they perform the main volume of their activities within that territory; their operations depend on decisions of district or city executive committees; they may or may not receive budgetary support; the shock affects a subset of transport enterprises conditionally united by a common characteristic of activity.

- **Medium (1)** – the subjects are different enterprises distributed across the territory of the country, with different management structures, and not dependent on budgetary support.
- **Low (0)** – a large number of entities nationwide that are not interconnected and do not receive budgetary support.

Losses – the scale of losses that may result from the realization of a given shock

- **Very high (3)** – realization of the shock leads to losses that go beyond purely economic damage and result in the suspension of transport services to the population, enterprises, or organizations of the country.
- **High (2)** – realization of the shock affects all sectors of the national economy or the operation of so-called budget-forming enterprises, but does not result in a complete cessation of transport services.
- **Medium (1)** – realization of the shock leads to a significant increase in transport service prices or requires a substantial increase in budgetary support for public transport operations, without a significant impact on the economy as a whole.
- **Low (0)** – realization of the shock does not lead to significant changes in the operation of the transport sector at the national scale.

The **overall risk level** is determined by multiplying the quantitative values of all three parameters.

Based on the results of the analysis, shocks were ranked according to their degree of impact. Tables 1–2 present the most significant and influential internal and external shocks.

Table 1 – The most significant and influential internal shocks

	Subject	Shock	Risk
1.	Passenger Transport Organizations	Sharp increase in refinancing rate, problems with leasing payments by passenger transport operators – aging of passenger transport fleet in Belarus	18
2.	Freight carriers	Fuel shortage	18
3.	Passenger transport organizations	Public transport operation in accordance with minimum social standards in the field	12

4.	Passenger transport organizations	Fuel shortage	12

Table 2 – The most significant and influential external shocks

	Subject	Shock	Risk
1.	The entire transport sector	Additional restrictions on the operation of border crossings with the EU	27
2.	The entire transport sector	Suspension or Significant Reduction of Energy Resource or Fuel Supplies from Russia to Belarus	
3.	Belarusian Railway	Exclusion of railways on the territory of Belarus from transit cargo transportation between East and West	18
4.	Belarusian Railway	Increase in tariffs for cargo transportation from Belarus via Russian railway infrastructure	18
5.	Belarusian Railway	Reduction of permitted volumes of trains with Belarusian wagons passing through the Russian railway infrastructure	18
6.	Passenger transport organizations, freight carriers	Introduction of additional exemptions for hiring professional drivers from Belarus in EU countries (Labor outflow: simplified recruitment of Belarusian drivers in the EU)	12
7.	Freight carriers	Reduced number of EU-issued freight permits	12

Shocks in the transport sector have occurred in various forms, at different times, and with varying intensity across different countries. In order to develop a set of measures aimed at overcoming and minimizing their consequences, an analysis of transport-sector crises in other countries was conducted. Crisis situations of various types were examined in Argentina, Bulgaria, Venezuela, the United Kingdom, Zimbabwe, the United States, India, Kazakhstan, Canada, Germany, Poland,

Ukraine, the Czech Republic, Chile, Sri Lanka, Estonia, and Japan. During an educational visit, specific aspects of the operation of transport systems in Budapest (Hungary) and Belgrade (Serbia) were also studied.

Based on the system analysis and the review of international experience with transport crises, a list of measures aimed at overcoming or minimizing the impact of internal and external shocks was сформulated. The list mainly includes adaptive and organizational measures targeting different modes of transport:

- Removal of the monopoly of Belarusian Railways (BCh), allowing foreign railway companies to operate on Belarusian railways, with the creation of a separate organization responsible for railway infrastructure maintenance.
- Updating tariff agreements between the railways of Belarus and neighboring countries.
- Organization of energy and fuel supplies from other countries at market prices.
- Use of bicycle transport for the delivery of small freight consignments (up to 1 tonne) within cities as a “last-mile” transport solution.
- Ensuring that public transport adequately meets passenger demand in regular services.
- Ensuring driver wages that are competitive with European levels.
- Changes in the operation of passenger carriers in regular intercity and international services.
- Reduction of personal income tax rates and mandatory social contributions on drivers’ wages and/or inclusion of the profession of professional driver in the list of activities subject to a professional income tax regime.
- Information support for participants in transport processes.
- Adjustment of motor fuel prices and/or abolition of fuel price regulation.
- Adjustment of social standards in the transport sector.
- Targeted temporary and permanent measures to support transport operators.
- Elimination of non-core activities from the operations of state-owned transport companies.
- Increase in passenger volumes carried by public transport.
- Increase in the permitted length of road trains on Belarusian highways without the need for permits for oversized and heavy vehicles.
- Increase in the length of freight trains with Belarusian wagons to the maximum possible extent.
- Increase in the share of passenger transport in regular services using medium-, large-, and especially extra-large-capacity vehicles.
- Increase in the share of electric transport in freight and passenger transportation.
- Increase in public transport fares and revision of tariff policy.
- Expansion of the use of electric and hybrid vehicles in road and rail freight and passenger transport.

- Increasing the attractiveness of the professional driver occupation among young people.
- Preparation of railway infrastructure for alternative freight transit routes.
- Improvement of drivers' working conditions.
- Promotion of alternatives to unstable public transport, such as carpooling, bicycles, and personal mobility devices.
- Reorientation of small, one-off freight consignments to road transport.
- Revision of logistics supply chains and search for alternative freight delivery routes.
- Revision of mechanisms for subsidizing public transport operations.
- Revision or clarification of the railway electrification program for Belarusian Railways.
- Negotiations with the railway administrations of Lithuania and Latvia on organizing container train services between China and Europe via Latvian and/or Lithuanian railway infrastructure.
- Programs for the urgent adaptation of border-area infrastructure near border crossings to changes in their operation.
- Development of multimodal routes for transporting large freight consignments to reduce overall delivery costs by combining rail and road transport.
- Development of light freight and passenger transport modes that can be used for "last-mile" services and do not require a professional driver's license.
- Development and implementation of carrier action algorithms in the event of abrupt changes in international freight transport.
- Development of Sustainable Urban Mobility Plans.
- Creation of prerequisites for the development of autonomous transport in the long term.
- Establishment of a support program for international carriers to slow the growth of transport costs.
- Temporary restrictions on fuel sales to private individuals.

Data from Tables 1 and 2 show that fuel shortages represent a significant shock for various modes of transport. This shock may occur in the event of a suspension or restriction of oil supplies from Russia. Measures related to energy supply shocks are described in detail in the study on the resilience of energy systems to external and internal shocks. In the transport sector, responses to fuel shortage shocks primarily involve adaptive measures aimed at minimizing negative impacts on the sector.

To overcome this shock, a set of standard resources is required, such as operational resources (transport, communications, organization of meetings), qualified personnel, and others. In addition to these, further resources requiring special preparation are also needed. Additional financial resources in the event of this shock would be required for:

- Increasing passenger and freight transport volumes using electric transport (expansion of production and procurement of electric vehicles, development of charging infrastructure, disposal or recycling of energy storage systems after decommissioning, etc.).
- Subsidizing the initial years of production of new electric trucks, renewal of freight vehicle fleets, or support for manufacturing facilities in order to ensure affordable prices for carriers.
- Covering increased costs in subsidized transport modes.
- Accelerating the pace of railway electrification.
- Creating a nationwide integrated cycling infrastructure.

In the short term, financial resources would be used to slow the growth of transport service tariffs; in the long term, they would support a reduction in transport volumes using internal combustion engines, with a corresponding shift toward transport using alternative energy sources.

For shocks related to additional restrictions at border crossing points, groups of measures are proposed depending on the type of restriction:

- Change of status of one or both border crossings with Lithuania.
- Closure of one of the border crossings with Lithuania.
- Limitation of border crossing operating hours.
- Artificial and permanent reduction of border crossing capacity.
- Complete suspension of transport movement through a border crossing.

A change of status implies a ban on processing either freight or passenger transport at a border crossing previously designated as freight-and-passenger.

Additional financial resources to mitigate the consequences of this shock would be required to develop and implement a support program for international carriers in order to slow the growth of transport costs and the corresponding acceleration of inflation in the country.

Driver shortages are currently relevant for Belarus, Russia, and the EU alike. Due to a series of events over the past five years (the COVID-19 pandemic, sanctions pressure, and migration from Belarus linked to political repression), workloads for Belarusian transport companies have declined. At the same time, in EU countries, freight and passenger transport volumes continue to grow, while the average age of drivers increases, young people show low motivation to enter the profession, and overall shortages persist.

These factors have already led to natural competition for drivers between the Belarusian and European labor markets. The European transport market currently offers higher wages, better working conditions, and rotational work schedules compared to Belarusian employers. As a result, the problem of professional driver shortages for Belarusian transport companies is expected to intensify over time.

A significant portion of measures aimed at attracting specialists to the driver profession can be implemented within the scope of routine organizational activities. However, the national budget should provide additional financial resources to mitigate the consequences of this shock for:

- subsidies to transport companies;
- education and training;
- implementation of a national autonomous transport program;
- development of “last-mile” transport infrastructure.

In recent years, Belarus has been actively renewing its passenger vehicle fleet, primarily through leasing. According to information obtained from employees of public transport organizations, new public transport vehicles are leased by state-owned operators for normative service lives of up to 10 years, depending on vehicle class and type. Lease payments are made by the operator and are included in subsidies provided from the budget. Private carriers do not receive budget subsidies and therefore cover leasing payments from their own funds, without compensation.

Given the existing financial model of passenger transport, the main “victims” of a sharp increase in the refinancing rate would be private carriers operating regular passenger services. In the absence of mitigation measures, such carriers may significantly reduce service volumes or cease operations altogether. Accordingly, action plans should include:

- changes to the financial model of regular passenger transport;
- compensation measures in the event of private carrier withdrawal;
- mechanisms for one-off support.

If this shock materializes, additional resources will be required to increase subsidies for ensuring the operation of public transport.

A shock involving transport operation strictly in line with minimum social standards would manifest in significant restrictions on public transport services. In certain cases, public transport services may be suspended on specific days of the week. The smaller the settlement (in terms of area and population), the more acutely the shock would be felt. In large cities and in settlements with city-forming enterprises, the shock may manifest through:

- cancellation of so-called “social” routes with relatively low passenger flows;
- increased headways on all routes to levels where vehicles operate with 80–100% occupancy at all times;
- suspension of public transport operations outside peak hours.

A prolonged realization of this shock would make it impossible, in the short term, to restore transport service volumes necessary for the stable functioning of a large number of organizations and enterprises.

The shock occurs when resources to support public transport operations effectively disappear. Accordingly, additional resources would include:

- additional financial resources to cover increased costs of subsidized road and urban electric transport;
- allocation of funds for organizing and conducting audits of public transport organizations;
- financial resources for developing Sustainable Urban Mobility Plans.

The shock associated with a reduction in the number of issued permits has a direct impact on carriers engaged in international freight transport between Belarus and European countries. Given Belarus's geographic position, this shock is likely to remain relevant until 2030.

Since permits are typically allocated on a parity basis, and Belarus generally requires significantly more permits than European carriers need from Belarus, the government cannot realistically influence a substantial increase in permit numbers without rapid economic growth, the creation of an open and predictable market for goods and services, changes in the political situation, and the lifting of sanctions.

As the number of permits for Belarusian freight carriers declines, the country's transport businesses will be forced either to change the direction of their activities—for example, shifting from international transport to or through the EU toward transport to or through Russia—or to cease operations or relocate to an EU country and become EU residents. Available official statistics (as referenced in Stage A of the report) indicate that these processes are already underway.

Thus, the only measures capable of overcoming this shock are changes in the political situation and the resumption of economic growth.

Following the outbreak of the Russia–Ukraine war, the main volumes of East–West rail transit have been carried out on routes from China to Europe. Consequently, the shock of excluding Belarusian Railways from transit traffic could materialize in the following cases:

- complete reorientation of rail flows to alternative routes at China's initiative;
- destruction of railway infrastructure between Smolensk and Orsha;
- closure of railway border crossings on the border with Poland.

To avoid exclusion from East–West transit, Belarusian Railways must ensure the operability of infrastructure along train routes and develop alternative routes in the event of border crossing closures.

Additional financial resources to prevent the consequences of this shock would be required to prepare Belarusian railway sections for increased freight volumes, specifically:

- construction of second tracks on single-track sections;
- electrification of alternative railway routes that may be used for container trains.

In the event of a significant increase in tariffs for transporting Belarusian goods over Russian railway infrastructure—due to the lack of alternative rail routes as a result of sanctions—transport will not cease, but costs for Belarusian transport service users will rise.

Implementing mitigation plans for this shock may require additional resources to subsidize tariffs or support Belarusian industrial enterprises that, due to rising transport costs, may otherwise be forced to reduce product prices.

Realization of a shock involving reduced permitted volumes for running Belarusian wagons on Russian railway infrastructure would lead to delays in the delivery of large freight consignments. Cargo with limited transport timeframes would likely be prioritized and therefore less affected.

Implementation of response plans for this shock requires political decisions. Non-political measures can be implemented using standard resources, such as operational funds (for travel, communications, meeting organization), qualified personnel, and similar resources.