2023 PRIME Benchmarking report

KPI & Benchmarking Subgroup PRIME

LEGAL NOTICE

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Foreword by PRIME co-chairs

We are pleased to present the eighth PRIME KPI and Benchmarking Report, which underlines the significant ongoing efforts to improve the performance and sustainability of the rail sector. An unprecedented 22 infrastructure managers participated in this year's report, underlining the commitment to data sharing, dialogue, and adoption of best practices across Europe.

This edition covers the period from 2019 to 2023 and provides a comprehensive view of the rail sector's challenges and achievements, particularly in light of the economic pressure caused by inflation. The COVID-19 pandemic initially led to a sharp decline in passenger numbers, and the onset of Russia's war against Ukraine impacted freight transport. Both events contributed to rising costs across the sector. Inflation has forced infrastructure managers to reassess investment priorities, balancing operational performance with the need for long-term sustainable network development. The financial data clearly reflect this challenging environment. Operational expenditure has seen an average annual decrease of 1.7% throughout the period in real terms, after deflating the data. The budgetary situation for capital expenditure was less strained, still showing an average annual increase of 3.4% in real terms. This growth has supported an increasing number of large-scale renewal and enhancement projects within the European rail network.

The benchmarking is an essential pillar in the quest for a more efficient, reliable, and sustainable rail network. It not only helps infrastructure managers to measure their own performance, but it also serves as a valuable resource for the European Commission to identify best practices and monitor progress towards EU policy objectives. Moreover, it provides all stakeholders with a lens through which to observe evolving trends, as well as the strengths and weaknesses within the sector.

Since the PRIME KPI & Benchmarking Subgroup was established in 2014, its contribution to developing a stable benchmarking framework at the EU level has been instrumental. Through regular meetings, exchanges, and the continuous enhancement of the dataset as well as improvements in analysis methods such as the inflation adjustment, the Subgroup has significantly improved the report year after year. The harmonisation of data definitions and KPIs, which is central to the Subgroup's efforts, results in the annual update of the KPI Catalogue, made available on the PRIME website.

We firmly believe that PRIME data and definitions can serve the needs of a large range of rail experts and policymakers. By measuring and sharing the results, we aim to demonstrate to the wider public that the rail sector is accountable toward the wider society and committed to improving services.

We would like to thank the PRIME KPI & Benchmarking Subgroup chairs Jude Carey from Irish Rail and Raymond Geurts van Kessel from ProRail together with the members of this group from 24 organisations, the Commission, and the European Union Agency for Railways, for this outstanding achievement. Your unwavering dedication has paved the way for this commendable accomplishment.

PRIME co-chairs

Kristian Schmidt
European Commission, DG MOVE
Director of Land Transport

Alain Quinet
SNCF Réseau
Chief executive officer, Strategy and Corporate Affairs

Executive summary

The Platform of Rail Infrastructure Managers in Europe (PRIME) was established to improve the cooperation between rail infrastructure managers across Europe and to assist in the knowledge transfer and benchmarking process of the participants. The following report is the eighth benchmarking report covering the years 2019-2023 and includes data of 22 infrastructure managers.

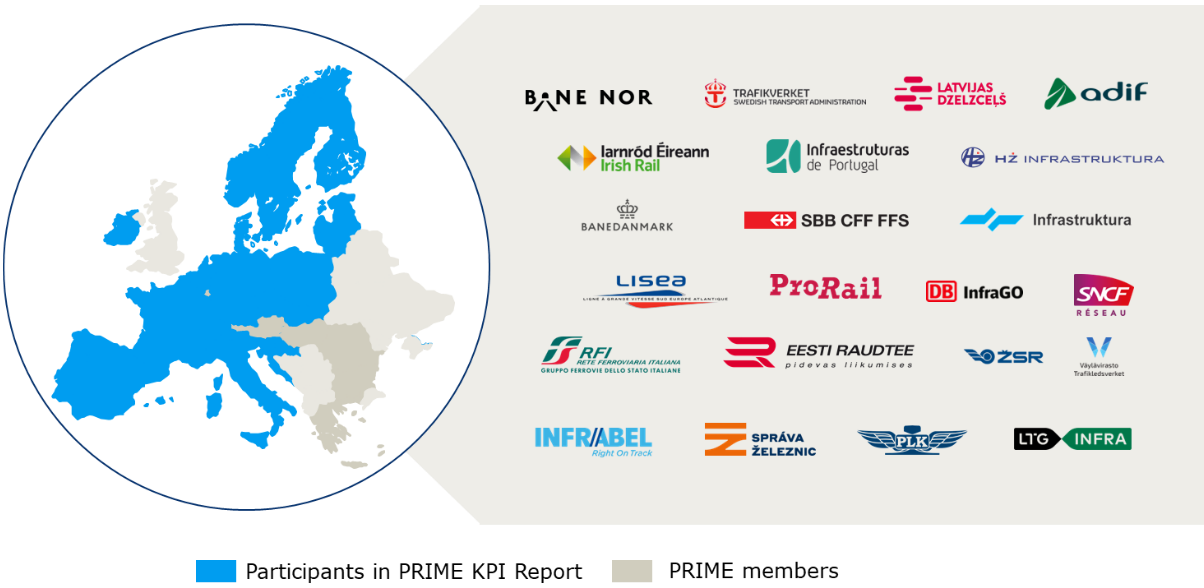

Figure 1: Participants of the PRIME KPI & Benchmarking Report and PRIME members

The period covered by this report has been a significant one for the European rail sector. On the one hand, the European Commission has taken several important initiatives to promote the sector, including the adoption of the European Green Deal and the Sustainable and Smart Mobility Strategy. These provide a roadmap for achieving ambitious emission reductions and preparing the sector for a smarter, more resilient future, alongside the related Action Plan.

On the other hand, this period has also presented significant challenges for the rail sector. In 2020, the outbreak of the Covid-19 pandemic led to an unprecedented decline in passenger ridership. In 2022, the beginning of Russia's war against Ukraine had a significant impact on the freight rail industry. Both events also contributed to soaring inflation, with prices remaining high and forcing railways to prioritise, revise plans and projects.

Infrastructure managers participating in the report allocated, on average, EUR 127 000 per main track-km to operational tasks in 2023, whereas capital expenditures have an average of EUR 171 000 per main track-km (both PPP-adjusted[1]). While operational expenditures have increased with a compound annual growth

[1] Source: Eurostat, Actual individual Consumption, status 01.2025. Please note that the PPP values for 2021 and 2022 are preliminary and may be revised in the next data release periods of Eurostat.

rate (CAGR) of 4.5% over the period between 2019 and 2023, capital expenditures of the peer group increased even more by a CAGR of 9.4%. It is crucial to consider that these figures are nominal values. After adjusting for inflation by deflating all years to 2019 price levels[2], a different picture emerges. In real terms, operational expenditures saw an average annual decrease of 1.7%, indicating a slight decline. Meanwhile, the increase in capital expenditures remained positive at 3.4%, though considerably lower than the nominal 9.4%.

This sustained rise in CAPEX, both in nominal and real terms, reflects a growing number of large-scale renewal and enhancement projects. Primarily driven by EU funding for electrification, the expansion of EU corridors, and the deployment of digital control systems, these projects directly impact rail network capacity. When capacity is constrained, this in turn affects passenger and freight train overall activity, including punctuality.

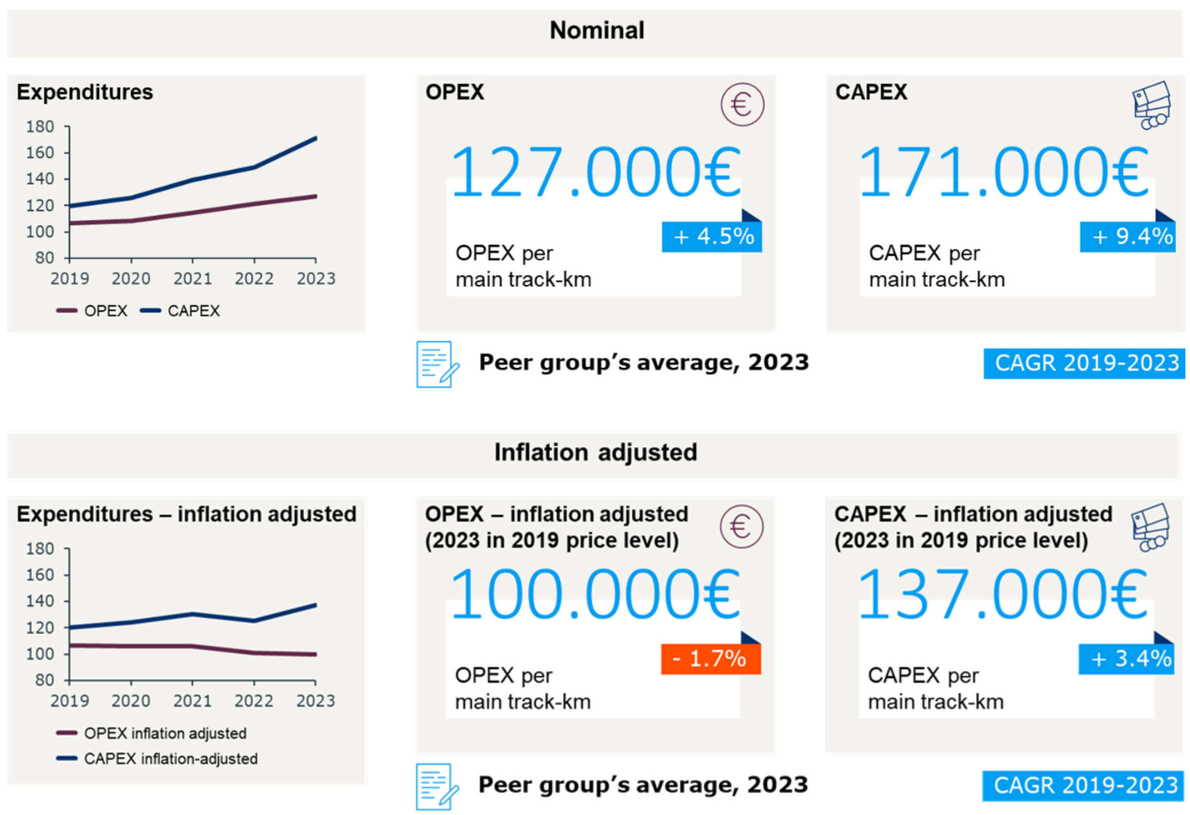

Figure 2: Summary of operational and capital expenditures[3]

The increasing expenditures on infrastructure would be difficult to justify if train activity on the networks of the IMs had not been on a continuous rise. Still, this trend was temporarily disrupted by the Covid-19 pandemic. Passenger train activity was around 30 trains per main track-km per day in 2019 but saw a significant

[2] Used inflation index: Eurostat, Construction producer prices or costs, new residential buildings https://ec.europa.eu/eurostat/databrowser/view/sts_copi_a$defaultview/default/table

[3] The time series chart, peer group's average and the compound annual growth rate (CAGR) include only those infrastructure managers that provided data for the full period from 2019 to 2023.

drop in 2020 due to the introduction of restrictive travel measures. Since then, it has slowly recovered and, as of 2023, has returned to pre-pandemic levels, with some organisations even managing to surpass their 2019 values. As train activity increased, passenger volumes also grew in 2023. Almost all EU countries saw increased rail passenger transport in 2023, with some infrastructure managers noting higher demand for long-distance trains.

While passenger train activity has largely rebounded, the situation for freight traffic has been markedly different While the pandemic's impact was less significant, freight rail experienced an average annual decline of 1.4% between 2019 and 2023. This downturn can partly be attributed to the drop in rail freight in the Baltic states, a trend that was intensified following Russia's war against Ukraine. Additionally, the decrease in freight rail can also be linked to increasing challenges and competition from other transportation modes, especially road transport, which has grown in recent years. Given that the economic situation is likely to remain difficult, this trend is expected to continue in the coming years.

Over the past five years, punctuality and utilisation have shown a negative correlation. In 2020, when train activity declined, punctuality peaked due to reduced traffic. However, since then, it has been continuously decreasing, with 2023 data indicating a return to pre-pandemic levels and an overall decline over the period. While record-high utilisation has played a role in declining punctuality, it is not the only contributing factor. The increased infrastructure investments will accomodate for higher utilisation, enhancing network capacity in the long term. As a side effect however, ongoing construction projects introduce short-term operational challenges by reducing buffer capacity and flexibility even more and resulting in further straining punctuality. In some of the largest stations and along critical track sections, capacity limits have already been breached, increasing delays and intensifying operational bottlenecks even further.

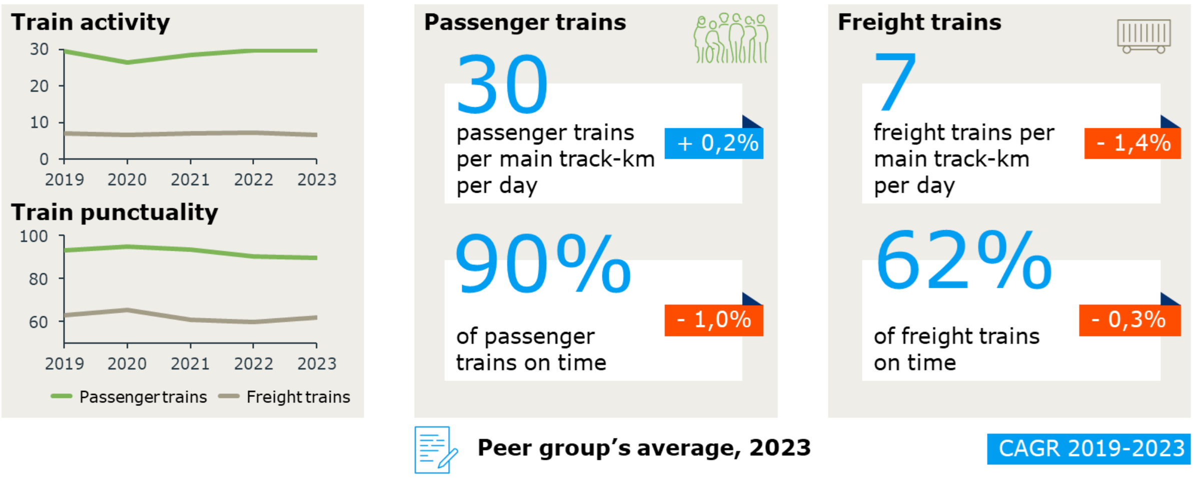

Figure 3: Summary of train activity and punctuality[4]

[4] The time series chart, the peer group average and the compound annual growth rate (CAGR) include only those infrastructure managers that provided data for the full period from 2019 to 2023.

The urgency to tackle climate change is ever-present. As the greenest mode of transport, the rail industry can and must play a major role in reducing emissions. At the same time, it must develop adaptation strategies to prepare itself and its infrastructure for the impacts of climate change. Electrification and the use of green electricity are among the most crucial steps toward reducing emissions. Over the past five years, the degree of electrification on main tracks has increased slightly by 0.4%, and the share of electricity-powered trains has also risen by 0.8%.

In addition to environmental concerns, ensuring the safety and resilience of rail operations is equally crucial. Railways are known for being among the safest modes of transport, which the European Commission aims to continue strengthening. Although accident rates remain low, there has been a slight increase in significant accidents on average between 2019 and 2023. However, it is important to note that due to the generally low numbers, individual events can have a disproportionately visible effect on the average. After reaching their lowest level in 2022, incidents related to infrastructure managers have increased slightly in 2023.

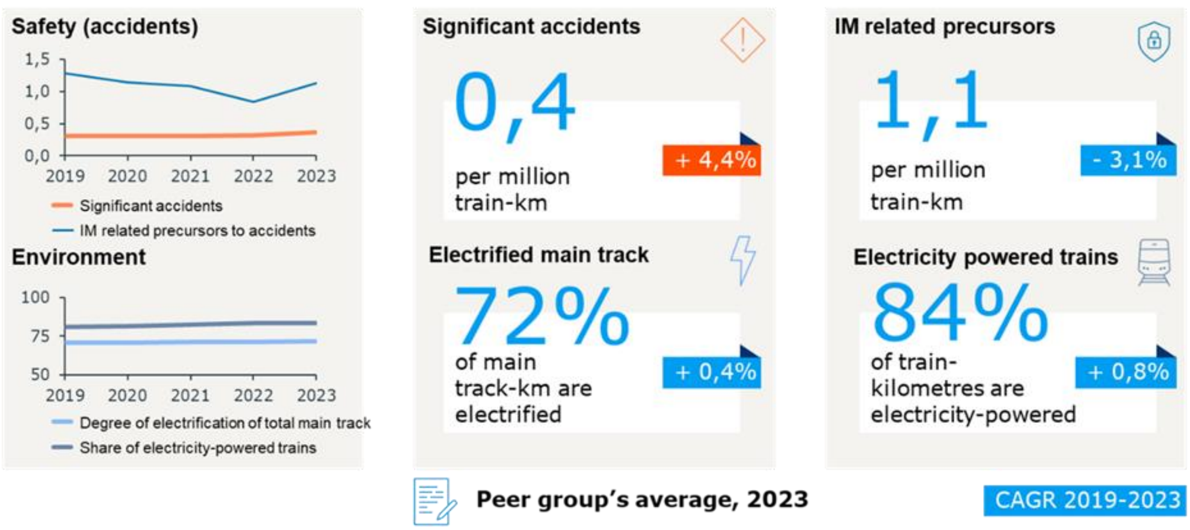

Figure 4: Summary of safety and environment[5]

[5] The time series chart, the peer group's average and the compound annual growth rate (CAGR) include only those infrastructure managers that provided data for the full period from 2019 to 2023.

1. Introduction

Today, transport emissions represent around 25% of the EU's total greenhouse gas emissions, making it the only sector to have increased its emissions since 1990[6]. In the fight against climate change, it is essential that the transport sector becomes greener and more sustainable, with a shift to more sustainable transport modes. The railway plays a key role in this transition, providing a viable alternative to cars for commuter and regional travel, and to aviation with long-distance and night trains.

However, achieving this requires strong commitment and concerted effort from all stakeholders, including railway companies, infrastructure managers, member states, and the European Union. The past few years have been particularly challenging for the rail sector. In early 2020, the outbreak of the Covid-19 pandemic required the swift implementation of safety and hygiene measures. Subsequently, the sector had to manage the sharp decline in ridership while maintaining essential services. The war against Ukraine further complicated the situation, as Solidarity Lanes Action Plan were established to maintain trade flows, with rail playing a critical role in facilitating alternative logistics routes. This was compounded by rising inflation and persistently high prices, which created a difficult environment for infrastructure operators.

Despite these challenges, the European Commission has remained proactive in strengthening Europe's rail transport sector. Between 2019 and 2023, the period covered by this report, several important steps were taken to continue this progress.

To counteract the threats of climate change, the European Commission committed itself to becoming the first climate neutral continent by 2050 through the introduction of the European Green Deal. One of the main aims of the plan is to reach a 55% reduction in net greenhouse gas emissions by 2030. An integral part of the European Green Deal is the Sustainable and Smart Mobility Strategy and the related Action Plan which includes 82 initiatives in 10 key areas for action, each with concrete measures. The strategy serves as a guideline for the next years, to achieve a 90% reduction in greenhouse gas emissions in transport by 2050 and is built around the objectives of creating a sustainable, smart, and resilient mobility sector[7]. Rail has an essential role in this transformation, which is why the Commission has set several ambitious rail transport-related milestones to be reached by 2050, such as to:

- **Double rail freight** traffic
- **Triple high-speed** rail traffic
- **Complete** a fully operational and multimodal **Trans-European Transport Network (TEN-T)** equipped for sustainable and smart transport.

[6] EEA: GHG emissions by sector in the EU-28, 1990-2016. https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-sector-in#tab-chart_1

[7] European Commission. New transport proposals target greater efficiency and more sustainable travel. https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6776

To fulfil its role in the European Green Deal and meet the objectives of the Sustainable and Smart Mobility Strategy, rail must be sustainable, safe, resilient, reliable, smart, and affordable. Moreover, it needs to be able to adapt to the changing needs of passengers and industries. Therefore, the achievement depends on the performance of both, rail operators and infrastructure managers (IM). The latter are responsible for developing, maintaining, and managing all aspects of the rail infrastructure. The PRIME KPI & Benchmarking Subgroup collects data to monitor their performances in these categories.

- **Safety** is a top priority. Although safety risks cannot be eliminated safety levels can be significantly improved by good asset condition and the adoption of safety policies. Investing in state-of-the-art technology (e.g. ERTMS), rethinking networks, stations, level-crossings, and training of track workers and awareness-raising campaigns for the public, are available tools for infrastructure managers.
- **Ensuring the optimal use of rail infrastructure** based on the needs of customers is essential and can be promoted through adequate instruments such as economic incentives and/or charging and performance schemes, in line with EU law[8]. As capacity is limited, and new construction is very costly and time intensive, getting maximum capacity out of the existing infrastructure network is paramount. This depends on efficient capacity allocation and traffic management, as well as on systems like the European Rail Traffic Management System (ERTMS), which allows for shorter head times between trains.
- **Strong cooperation between all actors across borders** is vital to enabling smooth operation between countries, overcoming fragmented national structures, and creating a truly open and interoperable railway market. It paves the way for major international projects and services linking European cities and citizens with each other. The Platform for Rail Infrastructure Managers in Europe (PRIME) is a central element of this cooperation. In 2021 the European Commission published a proposal for the revision of the TEN-T Regulation which includes strengthened parameters for rail infrastructure and introduces an extended core network covering additional strategic rail links. At the same time, the Commission presented an Action Plan to boost long-distance and cross-border passenger rail services, in order to make rail more attractive as a travel option. In the view of Russia's war of aggression against the Ukraine the European Commission presented its Solidarity Lanes Action Plan to help Ukraine export its products via rail, road and inland waterways.
- Efficient and far-sighted maintenance and renewals increase **reliability and availability**. Reducing the number of asset failures through proactive maintenance reduces delays and cancellations, thereby making rail more attractive to users. Conversely, tracks in bad condition, and therefore subject to permanent or temporary speed limitations or even closure, lead to longer travel times and in some cases lower utilisation, as the route becomes unattractive.

[8] Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area http://data.europa.eu/eli/dir/2012/34/oj

- Rail is already one of the most environmentally friendly and energy-efficient transport modes. But **environmental sustainability** is not only about more people using rail, but also about rail itself becoming greener. Looking at the trend in greenhouse gas emission by transport mode between 1990 and 2019 rail is the only mode that decreased its emissions by 60%[9]. Rail has the potential to become completely carbon neutral well before the rest of the economy by 2050.
- **Providing good value for money** is important, as infrastructure managers are largely funded by the public and State budgets are constrained. Governments have a part to play here too. In accordance with EU law[10], Member States must ensure that the accounts of infrastructure managers are balanced. Low levels of investment over an extended period can negatively impact operational costs, safety, and overall performance.
- **Digitalisation and Automation** are pivotal drivers of the modernisation of the rail system, facilitating seamless integration and significantly boosting efficiency. These technologies offer numerous opportunities to enhance the levels of safety, security, reliability, and passenger comfort.

[9] EEA Report: Transport and environment report 2021. https://www.eea.europa.eu//publications/transport-and-environment-report-2021 P. 17

[10] Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area. http://data.europa.eu/eli/dir/2012/34/oj

2. PRIME KPI & Benchmarking

Platform of Rail Infrastructure Managers in Europe (PRIME)

The Platform of Rail Infrastructure Managers in Europe (PRIME) was established between the European Commission's transport and mobility directorate general (DG MOVE), and rail infrastructure managers in 2013. Its main objective is to improve the cooperation between rail infrastructure managers across Europe. Furthermore, the platform supports and facilitates the implementation of European rail policy and develops performance benchmarking for the exchange of best practices.

Alongside the European Commission and the European Union Agency for Railways (ERA), PRIME now has 37 industry members including all main infrastructure managers of EU Member States and of the EFTA members Switzerland and Norway. Four industry associations of European rail infrastructure managers participate as observers[11].

KPI & Benchmarking Subgroup

A central idea behind PRIME is to give infrastructure managers, who are natural monopolies, an opportunity to learn from each other. The performance benchmarking currently covers several dimensions of rail infrastructure management: costs, safety, sustainable development, punctuality, resilience, and digitalisation. The core of the benchmarking is the catalogue, which contains a clear and concise documentation of the PRIME key performance indicators (KPIs).

The number of infrastructure managers participating in the subgroup has steadily increased. The first pilot benchmarking started in 2015 with 9 infrastructure managers collecting data predating to 2012. In this year's benchmarking, based on 2023 data, 23 infrastructure managers have contributed to the report, of which 22 are involved in the external report presented in the table below.

[11] PRIME members: https://wikis.ec.europa.eu/display/primeinfrastructure/About+PRIME

Infrastructure managers participating in the report

Infrastructure manager	Logo & abbreviation	Country
Adif	Adif	Spain
Bane NOR	Bane NOR	Norway
Banedanmark	BDK	Denmark
DB InfraGO AG	DB	Germany
AS Eesti Raudtee	EVR	Estonia
Finnish Transport Infrastructure Agency	FTIA	Finnland
HŽ Infrastruktura d.o.o.	HŽI	Croatia
Infraestruturas de Portugal S.A.	IP	Portugal
Infrabel	Infrabel	Belgium
Iarnród Éireann – Irish Rail	IÉ	Ireland
Latvijas dzelzceļš	LDZ	Latvia
AB LTG Infra	LTGI	Lithuania
LISEA[12]	LISEA	France
PKP PLK	PKP PLK	Poland
ProRail	ProRail	Netherlands
RFI	RFI	Italy
SBB CFF FFS	SBB	Switzerland
SNCF RÉSEAU	SNCF R.	France
Správa železnic, s.o.	SŽCZ	Czechia
SŽ-Infrastruktura d.o.o.	SŽ-I	Slovenia
Trafikverket	TRV	Sweden
Železnice Slovenskej republiky	ŽSR	Slovakia

Table 1: Infrastructure managers participating in the report

[12] LISEA (South Europe Atlantic High-Speed Rail Line) operates exclusively the high-speed line between Tours and Bordeaux.

Purpose and empirical methodological approach of the report

The purpose of the public report is to illustrate the current performance of infrastructure managers, to identify areas for further analysis and to provide relevant data to the railway industry and related sectors, politicians, researchers, economists, and other interested stakeholders. Above all, the general objective of the report is to deliver insight and inspiration for more informed decisions in developing a sustainable and competitive infrastructure management which can provide high quality services.

In this report, the key indicators will each be shown in a benchmark graph and a time series graph, presenting a cross-comparison of infrastructure managers and key trends. As for previous reports, data for the last five years is included: this year's report covering 2019-2023. Basing the yearly reports on 5-year time series as opposed to the entirety of historical data since 2012 puts the focus on most recent developments as well as **allows for more companies to be presented in the graphs as it makes it easier for new members to reach the threshold for historical data.** To ensure clarity and comparability, only complete time series are shown, including the average development of the peer group. The time series charts are complemented with the compound annual growth rate (CAGR) to increase the visibility of the overall developments. The CAGR also only shows complete time series.

The benchmarking charts show 2023 data (or the latest available year) and the average of the years 2019-2023 for every individual infrastructure manager[13], plus the peer group's average weighted by the denominator. This weighting means that, if, for example, the KPI reflects cost per main track kilometre (denominator), organisations with large networks will have a correspondingly higher impact on the weighted average. Thus, the weighted average reflects the average of the combined total network of all participating infrastructure managers. The accuracy of the data is indicated and highlighted in a lighter colour in the charts for values that deviate from the standard. The reason for including deviating figures even if they are less comparable is to provide a more complete dataset and enable more infrastructure managers to contribute data. Fewer deviating figures are anticipated with each future report. The benchmarking charts always list the 22 infrastructure managers that took part in the report, regardless of whether they have delivered data for the specific KPI or not. This means that 0 can mean either 0 or no data, zero values are indicated in the footnote[14].

It is important to note that railway as a system consist of both railway undertakings (RUs) and infrastructure managers (IMs), which are together responsible for a smooth operation of rail traffic. This report however represents exclusively data from infrastructure managers, and not railway undertakings.

The quantitative results can only be interpreted meaningfully if the main influencing factors are considered. Without considering the different characteristics of the infrastructure managers and their structural peculiarities, meaningful comparisons cannot be achieved. LISEA for example

[13] Infrastructure managers are abbreviated as "IM" in the charts.
[14] The weighted average includes zero values.

exclusively operates one high-speed line and has a regional network, whereas the other infrastructure managers are active nationwide. To facilitate the interpretation of the figures and the quantitative results, background information on the specific contexts of the infrastructure managers and rail infrastructures is provided for each indicator. More general information on influencing factors can be found in the Annex 4.1, and some macro level data on the infrastructure managers and the countries they are operating in can be found in Annex 4.2.

Selected indicators and report structure

The indicators presented in this report are selected from the data pool of the PRIME KPI & Benchmarking Subgroup. They aim to display a status quo alongside the European objectives, covering the fields of finance, safety, environment, performance, and delivery. Figure 4 shows these groups as well as the selected indicators that are analysed in the report. The numbers next to the KPI point to the chapter in which they are treated.

This year's report will include additional contextualisation and background information on the financial situation of infrastructure managers, with the data adjusted for inflation. This is important in order to demonstrate the development of the costs and revenues in real terms, which enables a clearer understanding of financial trends over time.

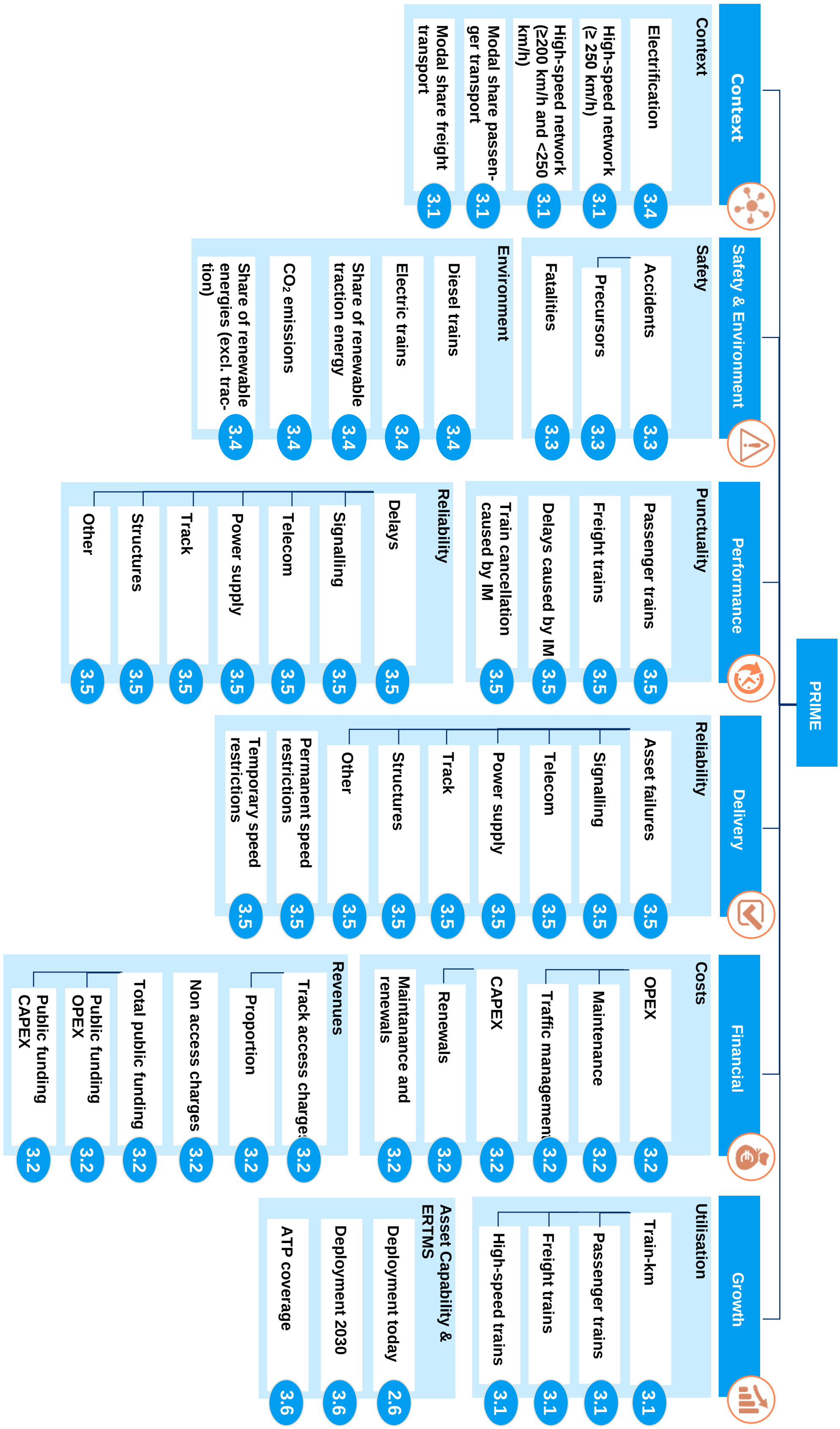

Figure 5: Selected indicators for the report and their chapters in the report

3. Main rail industry characteristics and trends

This core chapter aims to give an overview of the development and status quo of the infrastructure managers' performance. Indicators for finance, safety, environment, performance, and delivery, and ERTMS deployment are used.

Before analysing specific indicators, it is important to understand the major characteristics and trends of the rail industry in the states of participating members. To permit this, the development of the following aspects will be outlined briefly in the following chapters: modal share, network, and utilisation.

3.1 Overview of main rail industry characteristics and trends

3.1.1 Summary of industry characteristics

EU-wide objectives

- Increasing the passenger volume in rail and shifting more freight transport from road to rail are key objectives of the European Green Deal and the Sustainable and Smart Mobility Strategy.
- Rail needs to be an attractive alternative to more polluting modes of transport, both for passengers and freight.
- The EU's Sustainable and Smart Mobility Strategy lays the foundation for making the EU transport system greener and supporting digital transformation. It sets out ambitious rail-related targets by 2050[15], such as to:
  - Double freight traffic
  - Triple high-speed traffic
  - Complete a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high-speed connectivity

Peer group's performance

- The development of network utilisation reflects the circumstances of recent years:
  - The Covid-19 pandemic significantly impacted passenger transport, causing a decline, followed by recovery trends as restrictions were lifted

[15] COM/2020/789 final: Sustainable and Smart Mobility Strategy – putting European transport on track for the future. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0789&from

  - Russia’s war against Ukraine has affected freight train activity and freight volumes.
- The network size ranges between 670 (LISEA) and 55.200 (DB) main track-kilometres.
- The average density of the peer group’s network is 59 main track-kilometres per 1.000 km^2.
- The degree of utilisation ranges between 8 and 69 passenger trains and 0 and 19 freight trains per main track-kilometre per day.
- High-speed train activity increased significantly in more countries on average by 2.2%

3.1.2 Development and benchmark of industry characteristics

Rail infrastructure is developed over decades and determines the shape and the management of the network for long periods of time. This chapter aims to give an overview of the status quo on the rail sector of the country operated in and shows the infrastructure manager’s main network characteristics on a macro level.

Rail characteristics indicators:

PRIME members are reporting twelve indicators on rail characteristics:

- National modal share of rail in passenger transport
- National modal share of rail in freight transport
- Total track-kilometres
- Total main track-kilometres
- Proportion of high-speed main track-kilometres (≥ 200 km/h and <250 km/h)
- Proportion of passenger high-speed main track-kilometres (≥ 250 km/h)
- Total main line-kilometres
- Total passenger high-speed main line-kilometres (≥ 200 km/h)
- Degree of network utilisation of passenger trains
- Degree of network utilisation of freight trains
- Degree of network utilisation of passenger high-speed trains (≥ 200 km/h)
- Degree of network utilisation of all trains
- Number of passengers transported by rail
- Goods transported by rail and road

To increase comparability of these values across infrastructure managers, utilisation is measured in train-kilometres per main track-kilometre.

Modal share of rail transport

Modal share is an important indicator for the European Union in developing sustainable transport. For passenger inland transport the modal share compares the share of passenger cars, buses/coaches, and railways. The modal share of rail in freight inland transport shows the national rail tonne-kilometres compared to total tonne-kilometres carried on road, inland waterways, and rail freight. Figure 6 and Figure 9 present the benchmark of the modal share of rail in inland passenger and freight transport in the participating Member States, based on data of the European Commission. Figure 7 and Figure 10 show the national trends of rail in inland passenger and freight modal share development. As Eurostat typically publishes modal share data in the spring of each year, the latest available value at the time of this report's publication is for 2022.

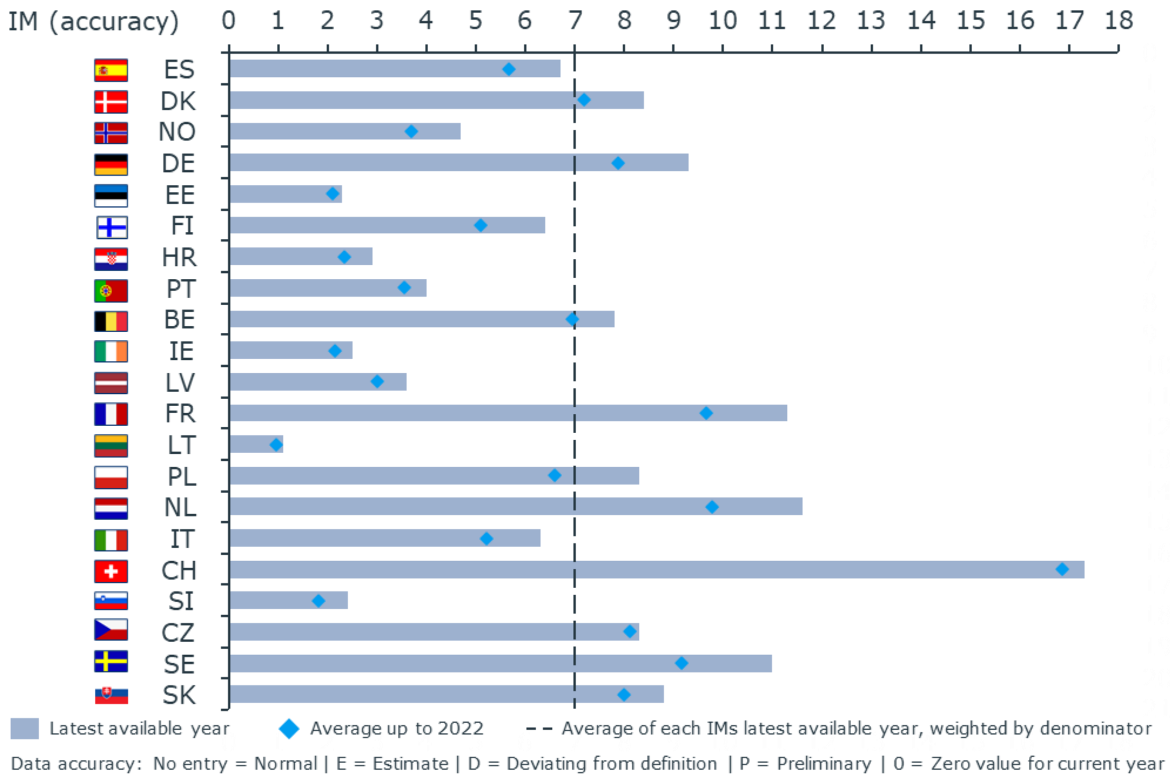

Figure 6: National modal share of rail in inland passenger transport (% of passenger-km)[16]

Figure 6 shows the cross-comparison of the states of participating members in 2022 for passenger rail transport. The peer group's average is 7%, while the

[16] Source: European Commission, Eurostat. MS = Participating state

spread across the peer group is 4%. The highest modal share can be found in Switzerland with a modal share of over 17% for rail, while the lowest value for passenger rail is in Lithuania with 1%.

The blue rhombuses in the figure indicate the average value between 2019 and 2022. It is visible that most countries had a significantly higher value in 2022 compared to the average of these years, which was impacted by lower ridership during the pandemic years.

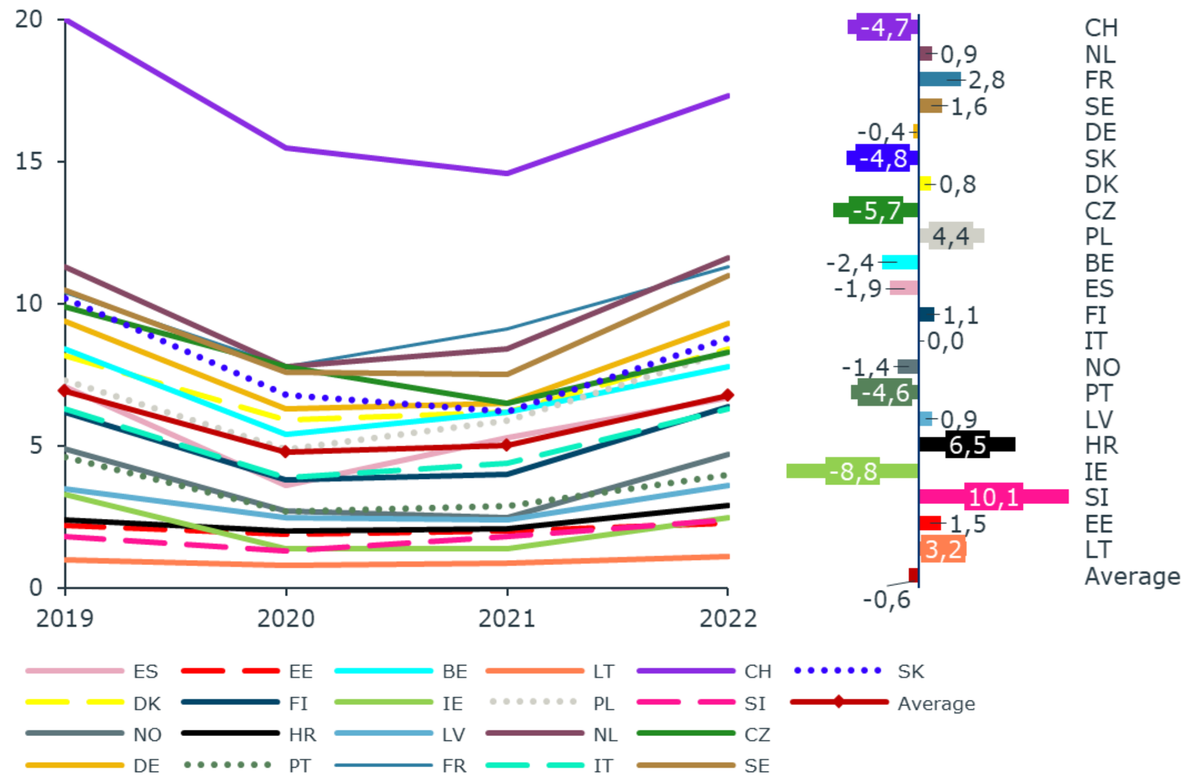

Figure 7: National modal share of rail in inland passenger transport (% of passenger-km) and CAGR (%) in 2019-2022[17]

Figure 7 visualises the development of the modal share of passenger rail transport for the participating countries from 2019 to 2022. The data highlights the impact of the COVID-19 pandemic from its onset in early 2020 until 2022, when most travel restrictions had been lifted. From 2019 to 2020, the average decrease in the modal share of rail transport was 30%. In 2021 the modal share remained relatively low, as many travel restrictions were still in place, and people were cautious about using public transport modes like rail. In 2022, however, most countries reached pre-pandemic levels, with some even exceeding their 2019 values. Notable examples include Slovenia, France, Poland, and Sweden. While there is an overall positive trend in all countries, a small portion remain on lower modal shares than pre-pandemic levels, such as Slovakia, Czechia, Ireland and Portugal.

[17] Source: European Commission, Eurostat.

Notably Switzerland also remains below this level while still maintaining the highest overall modal share.

The modal share in passenger transport in a country highly depends on several geographic and socio-demographic factors as well as the network size, density, and utilisation. The main parameters affecting the mobility choice are travel time, availability and reliability, supply of alternative transportation means, comfort, and price factors. Switzerland is a good example for having relatively good conditions in most of these parameters. As the country has a comparatively small territory, the travel distances are comparatively low. Due to the high rail network density and frequency, most of the cities can be reached in fairly short amounts of time. Additionally, its performance in punctuality and reliability is high and the travel comfort and quality of rail services are among the best. Furthermore, it is important to note that Switzerland also has a long-term vision in rail infrastructure development, accompanied by a substantial budget.

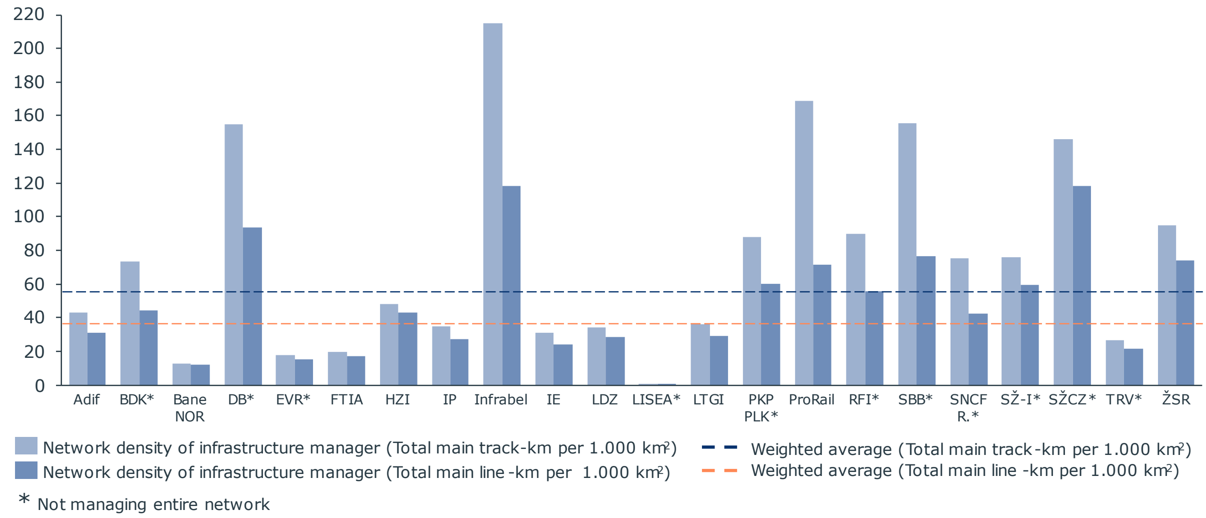

Figure 8: Network density of infrastructure manager (Total main track-km and total main line-km per 1.000 km²)

Network density of the infrastructure managers is illustrated in Figure 8 measured in both main line-kilometres and main track-kilometres. It is important to note, that the graph does not reflect the national railway density of the country, but the network of the infrastructure managers represented in this report. Infrastructure managers that do not manage the entire national network are marked with an asterisk next to the company's name[18]. Network density measured in main line-kilometres per square kilometre describes the coverage of the area from an operational perspective. In other words how well the area can be supplied with trains in the first place. Main track-kilometres per square kilometre describes the network density from the infrastructure manager’s perspective, showing how many assets are managed in the respective area, which is a better indicator for the capacity of the network. Infrabel has the highest network density followed by

[18] IRG Report 2024: 2024 - Market Monitoring - IRG Rail

ProRail, SBB and DB, while Bane NOR, EVR and FTIA have the lowest. LISEA is a special case as it operates exclusively the high-speed line between Tours and Bordeaux.

Socio-demographic factors such as mobility demand, age structure, income level, household size, car ownership and environmental awareness might also play a role in determining the modal share. With reference to income levels, the effect on rail usage can point in both directions: an increase in income level might have an impact on car ownership and consequently reduce the number of people traveling by train or higher income might increase the number of people who can afford to travel by train. In addition, the drastic change in work and travel patterns during the pandemic might have lasting effects on modal share and mobility. The effect of home office options seems to show in the passenger numbers, some infrastructure managers report that especially on Fridays the trains are emptier than before.

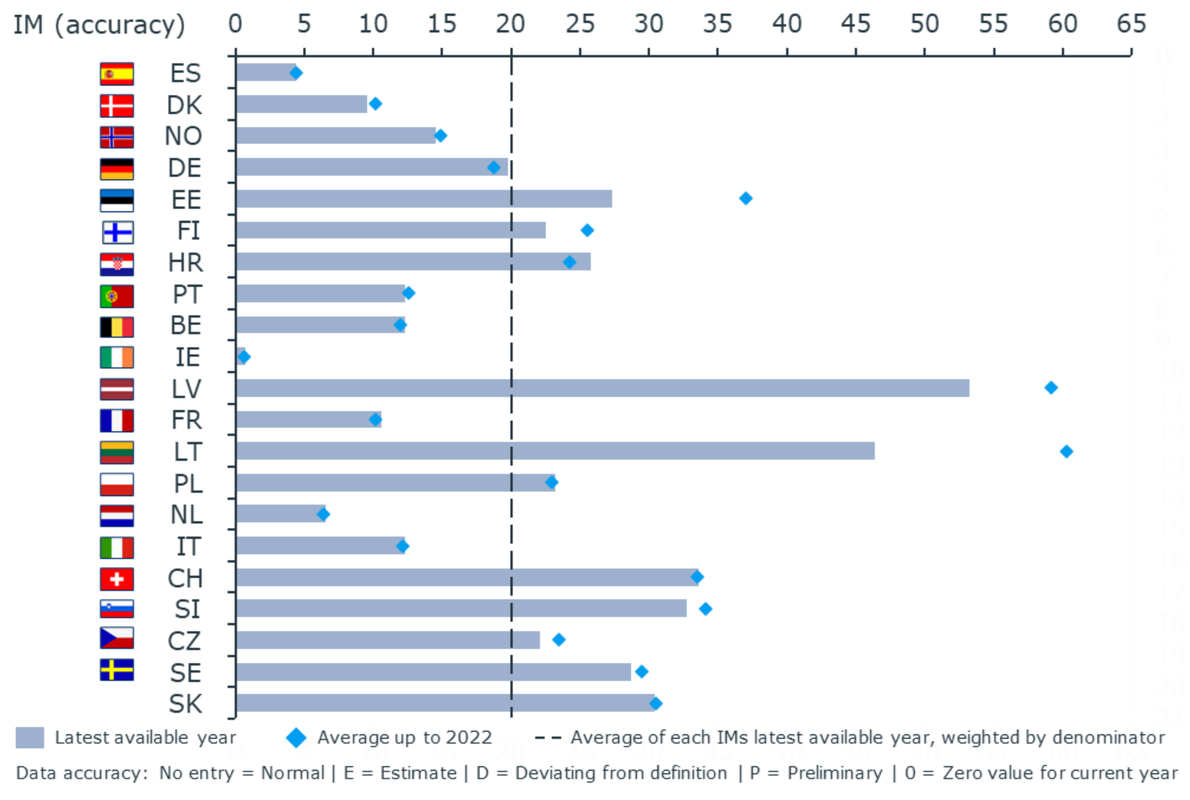

Figure 9: National modal share of rail in inland freight transport (% of tonne-km)[19]

The bandwidth of individual results for freight is more significant than the one of passenger transport. This is also reflected by the standard deviation of 14%. It is noticeable that the share of rail freight in the Baltic countries is significantly higher than in the rest of the EU. In Latvia rail accounts for 53% and Lithuania for 46%

[19] Source: European Commission, Eurostat, 2021 data. MS = Participating state

of the total inland freight transport, followed by Switzerland with 34%, and Slovenia with 32%. The peer group's average is 21%, all figures rounded[20].

However, it is clearly visible from the blue rhombuses that in 2022 rail freight significantly decreased in the Baltic countries compared to the average of previous years. This decline reflects the changed economic and political circumstances in the region. While less pronounced this trend is also visible in other countries, especially in eastern and northern Europe namely Czechia, Slovenia, Denmark and Finland.

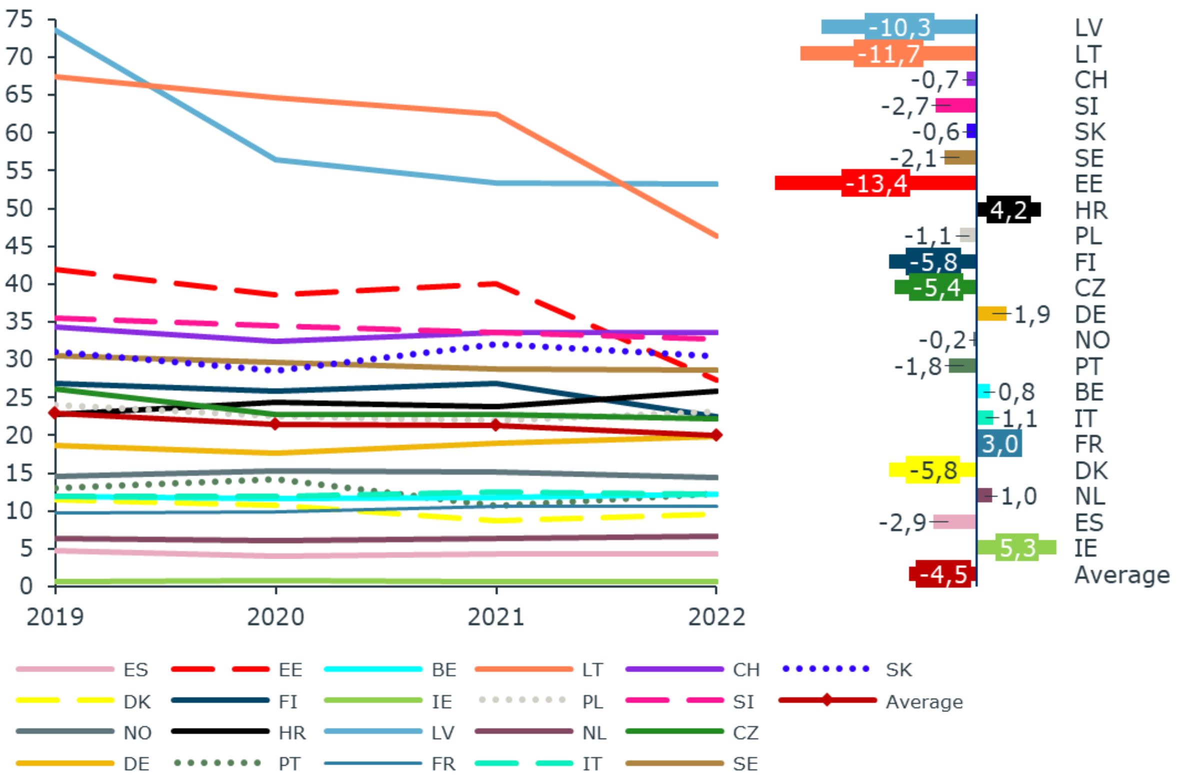

Figure 10: National modal share of rail in inland freight transport (% of tonne-km) and CAGR (%) in 2019-2022[21]

Figure 10 shows the development of the national modal share in rail freight transport between 2019 and 2022. The data from 2020 to 2022 indicates that the COVID-19 pandemic had a lesser impact on freight traffic compared to passenger traffic. However, there was an ongoing significant decrease in the rail freight share in the Baltic countries: Estonia experienced a decrease of 13.4%, Lithuania a decrease of 11.7% and Latvia saw decreases of 10.3%. These reduced cargo volumes can be attributed to the current political relationship with Russia, limited

[20] Reporting freight modal share in tonne-km means that the distance travelled is considered. When considering only the volume of tonnes transported, modal share values can significantly differ from modal share values in tonne-km.

[21] Source: European Commission, Eurostat.

cargo transportation through Latvia, improved Russian port infrastructure, and a decreased demand for coal in Europe.

Additionally, the rest of the countries showed a declining trend, averaging a 4.5% decrease. The only countries with a more significant increase in rail freight volume during this period were Ireland (however starting from a very low base), Croatia and France.

As already highlighted, the Baltic countries show the highest share of rail in freight. These can be linked partly to the transit transport of Russian energy products but might also have its roots in the history of these countries[22]. In the post-war period the extension of freight rail transport became an important pillar of the industrialisation of Eastern European countries. Czechia and Poland also possess higher levels of freight activity. Switzerland, however, has almost no heavy industry but has a relatively high rail freight share. Explanations could be the Swiss ban on night-time trucking, its general rail-friendly transport policy, and its strategic position in Europe.

Macro-economic aspects, such as trade relations and the organisation of the logistics sector of a country, also have an impact on the freight sector and therefore on rail freight traffic. Network density and transport corridors between economic centres, as well as transshipment points such as ports and airports, are equally important. The growth of e-commerce and the associated change in the logistics sector is not reflected in the data of rail freight development. An increase in interconnected multimodal transport solutions can support a shift to rail. However, this development must be initiated by the rail freight operators. Given the EU's policy objectives, it is important to continue to monitor this development. Rail freight needs serious boosting through increased capacity, strengthened cross-border co-ordination and cooperation between rail infrastructure managers, better overall management of the rail network, and the deployment of new technologies such as digital coupling and automation[23].

Network size

This subchapter aims to give a better overview of the network size operated by the infrastructure managers and presents its network measured in total track-kilometres, in total main track-kilometres, and total main line-kilometres. It furthermore illustrates the high-speed network of relevant infrastructure managers. Figure 11 and Figure 13 show the benchmark and Figure 12 and Figure 14 show the development of the network in main track-kilometres and high-speed main line-kilometres for selected infrastructure managers.

[22] DG MOVE (2015): Study on the Cost and Contribution of the Rail Sector.

[23] COM/2020/789 final: Sustainable and Smart Mobility Strategy – putting European transport on track for the future. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0789&from

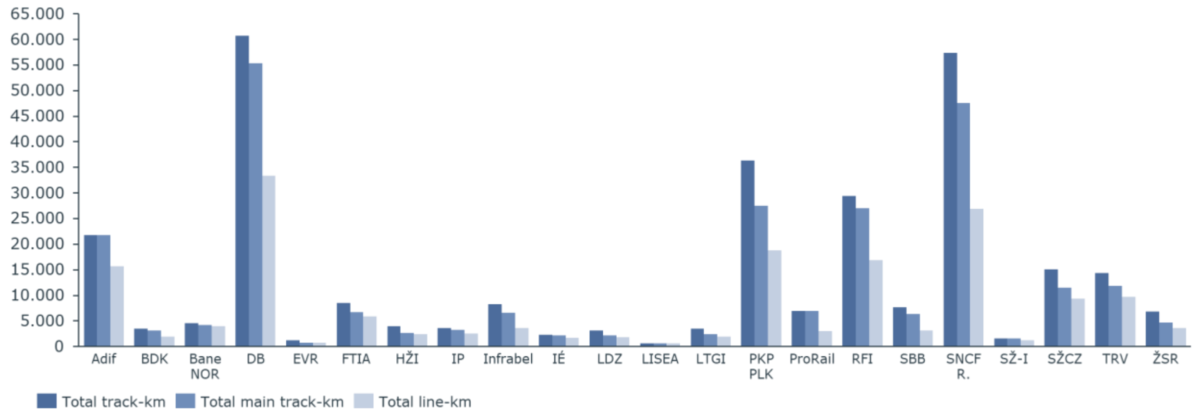

Figure 11: Total track-km, Total main track-km and Total main line-km[24]

Figure 11 shows the benchmark of the network in different units of measurement. It shows the network distinguished between total track, total main track and total main line. While total track-kilometres show the cumulative length of all tracks maintained by the infrastructure manager, total main track-kilometres exclude tracks at service facilities[25] which are not used for running trains. Total main line-kilometres indicate the cumulative length of railway lines operated and used for running trains by the end of reporting year. By comparing total track kilometres and total line kilometres, one can identify the share of double tracks in the network. Infrabel, ProRail, and SNCF Réseau have a very high proportion of double tracks, whereas the networks of Bane NOR, FTIA, and IP are predominantly single track.

In terms of size, SNCF R. and DB manage the largest networks, each with approximately 60,000 kilometres of track. On the other end of the spectrum, the smallest networks by track size are operated by LISEA, SŽ-I, and EVR. Notably, LISEA does not manage a countrywide network but exclusively operates the South Europe Atlantic High-Speed Rail Line.

It is important to recognise that these statistics do not cover the entire national railway network, but only the segments managed by the infrastructure managers within the peer group. In addition, the size of a network is closely related to the size of the country and its population density. Population distribution also plays an important role, potentially leading to network concentrations in urban centres or along specific corridors.

[24] LISEA has no countrywide network but is operating the South Europe Atlantic high-speed rail line.

[25] Service facilities are passenger stations, their buildings, and other facilities; freight terminals; marshalling yards and train formation facilities, including shunting facilities; storage sidings; maintenance facilities; other technical facilities, including cleaning and washing facilities; maritime and inland port facilities which are linked to rail activities; relief facilities; refuelling facilities and supply of fuel in these facilities.

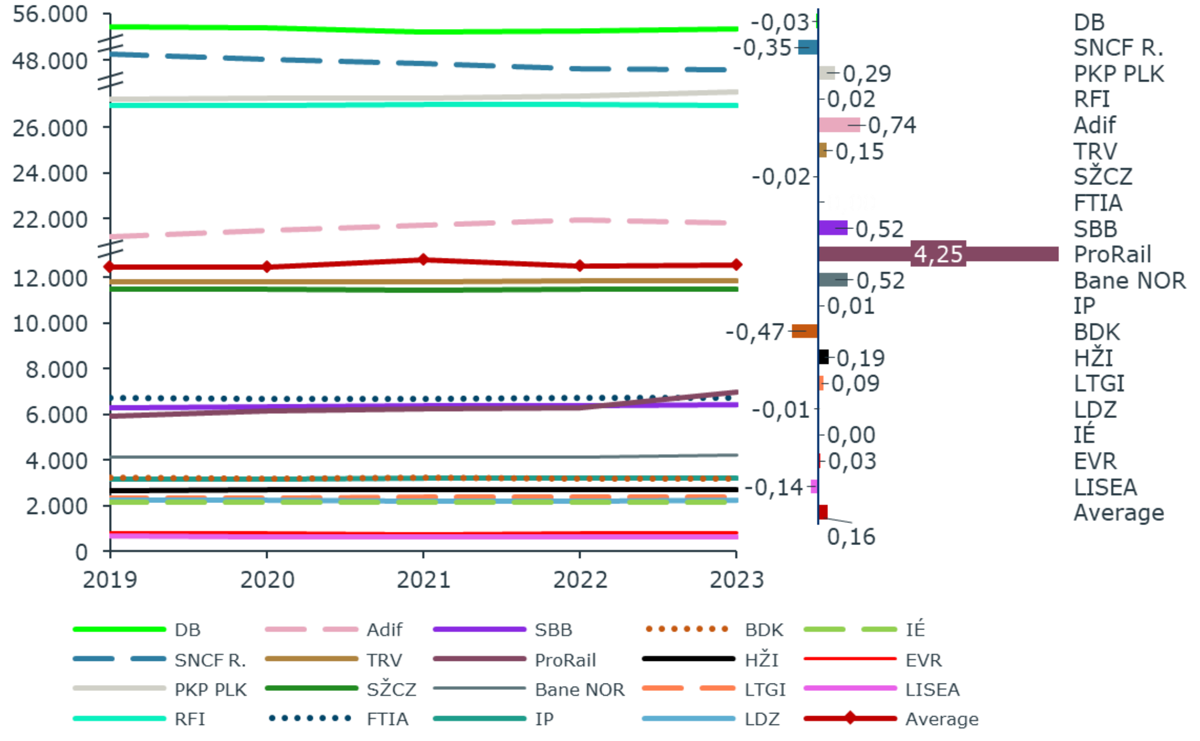

Figure 12: Total main track-km and CAGR (%) in 2019-2023

As illustrated in Figure 12, rail networks mostly remained unchanged over the years, reflecting the long-term character of rail infrastructure. The more notable expansions in the networks of Adif, SBB and ProRail can be attributed to distinct factors. Adif's increase is primarily the result of an extensive development of its high-speed network. SBB’s increase is mainly due to the opening of the Ceneri Base Tunnel in September 2020 through the Alps. However, ProRail's more considerable growth is due to a change in the methodology used for calculating the main tracks.

Current network extension programs are highly dependent on the status of rail within the country, funding agreements and budgets available. These factors in turn are closely linked to a country’s economic power. Eligibility for EU-funds is another important factor, especially with regards to the extension of high-speed lines, as EU cohesion policy-related financing is one of the major sources of rail funding. Most of the network extensions in Eastern and Central European countries, in Portugal and Spain were co-financed to a significant extent by the EU.

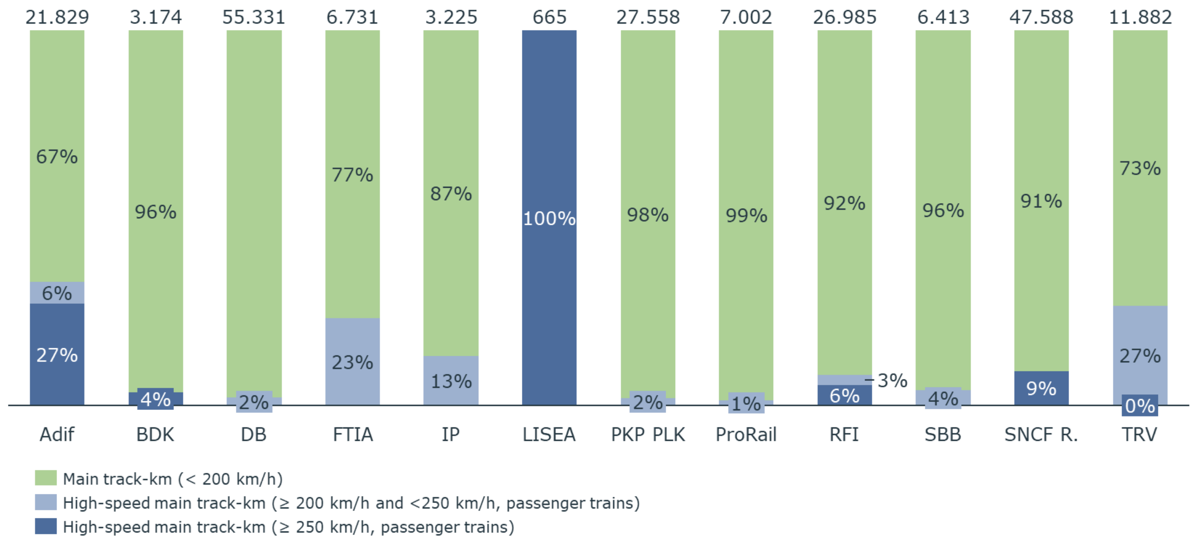

Figure 13: Share of high-speed main track-kilometres (in % of total main track-km)

Figure 13 shows selected infrastructure managers which also operate high-speed lines and their share of the network. The dark blue indicates the share of total passenger high-speed main track-kilometres that allows a speed equal or above 250 km/h. The lighter blue colour shows the lengths of high-speed tracks between a speed limit of equal or higher to 200 km/h and lower than 250 km/h. The high-speed lines have furthermore following characteristics:

- specially built high-speed lines equipped for speeds generally equal to or greater than 250 km/h,
- specially upgraded high-speed lines equipped for speeds of the order of 200 km/h,
- specially upgraded high-speed lines which have special features because of topographical, relief or town-planning constraints, on which the speed must be adapted to each case.

The last category also includes interconnecting lines between the high-speed and conventional networks, lines through stations, accesses to terminals, depots, etc. travelled at conventional speed by 'high-speed' rolling stock.[26]

As shown in Figure 13, there is a significant variation in the proportion of high-speed lines among the compared infrastructure managers. LISEA operates exclusively on high-speed lines, in contrast with ProRail, where high-speed tracks constitute only 2% of its network. Adif holds the most extensive network of high-speed lines, enabling trains to travel at speeds of over 250 km/h along 5.932 kilometers of its main track. This accounts for a quarter of the total network managed by the infrastructure manager. In third place is SNCF R, with 9% of its

[26] Source: Glossary for Transport Statistics, A.I-04. Directive (EU) 2016/798 on the rail interoperability, Annex I, Article 1

network supporting speeds over 250 km/h, followed by RFI with 6%. TRV and FTIA each have approximately one-quarter of their networks allowing for speeds up to 250 km/h.

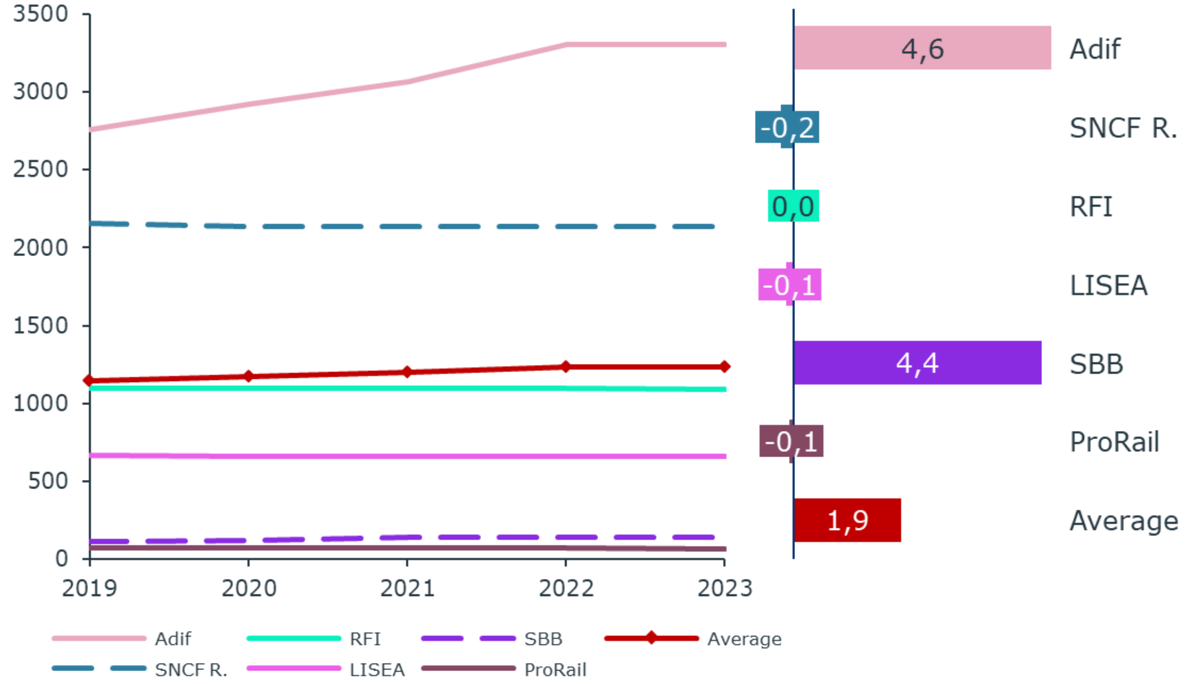

Figure 14: Total high-speed main line-kilometre (≥ 200 km/h) and CAGR (%) in 2019-2023[27]

Figure 14[28] shows the development of high-speed network of the relevant infrastructure managers. Three infrastructure managers increased the length of their high-speed lines (≥ 200 km/h) between 2019 and 2023. SBB increased its high-speed network mainly due to the opening of the Ceneri Base Tunnel through the Alps in September 2020. Adif increased the absolute length of its high-speed main lines by over 650 kilometres between 2019 and 2023 due to the commissioning of new sections on the high-speed lines to Granada, Galicia, Asturias, Burgos, or Murcia.

In the context of developing high-speed rail networks, it is essential to consider the geographical layout of a country. For countries with large distances between major cities, the benefits of a high-speed network are much greater. Such a network can drastically reduce travel times, making long-distance train travel a competitive option compared to flying or driving.

Conversely, in countries where major urban areas are relatively close together, the impact of high-speed rail may be different. The strategic development of these networks requires a nuanced understanding of each country's specific needs and

[27] Zero values are not included in the weighted average in this chart.
[28] Please note that this figure, unlike the charts above, shows high-speed lines and not high-speed tracks.

geographical challenges to ensure that the benefits of high-speed rail can be fully realised.

Network utilisation

As mentioned in the introduction, the period covered in this report has been impacted by external crises, such as the Covid-19 pandemic and the onset of Russia's invasion of Ukraine. These events are reflected in the utilisation data, which is a key measure of the performance of an infrastructure manager. Figure 15 presents the aggregated benchmark of the degree of network utilisation by passenger and freight trains. Figure 16 to Figure 22 show the development chart of these indicators.

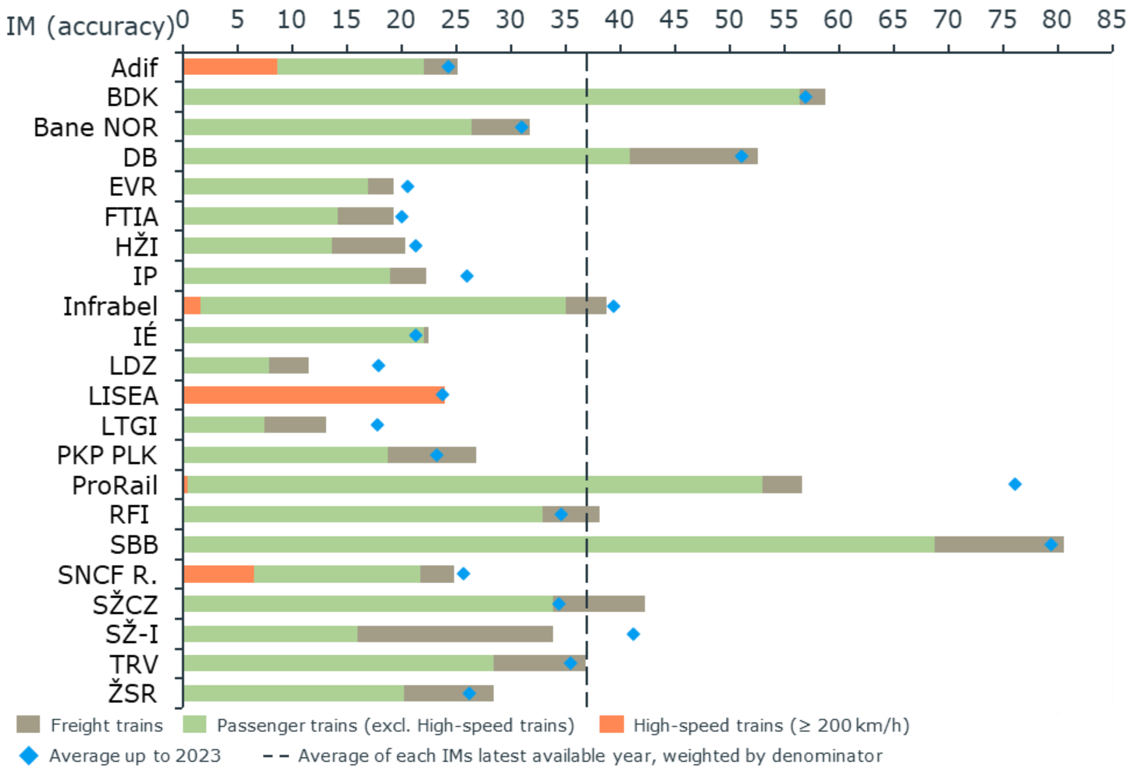

Figure 15: Degree of network utilisation – all trains (Daily train-km per main track-km) [29]

Figure 15 illustrates the network utilisation of passenger, freight, and passenger high-speed trains (≥ 200 km/h). The reason why there are less infrastructure manager showing their high-speed train activity than companies managing high-speed network, is because not all infrastructure managers distinguish high-speed trains from regular passenger trains. The intensity of network use of passenger trains is marked with green colour and ranges from 8 to 69 trains per day. SBB's, BDK's and ProRail's networks are utilised notably more than the average. LTGI and LDZ have the lowest utilisation rates for passenger trains. The orange colour shows the activity of the high-speed passenger trains, LISEA having the highest

[29] RFI data for passenger trains in green includes high-speed trains, as opposed to the rest of the chart

utilisation with 23 daily train-km per main track-km, which only accommodate high-speed trains. SNCF R. and Adif have similar levels with around 8 daily train-km. Utilisation of freight trains is provided in grey.
SŽ-I, DB, and SBB have the highest intensity of use with more than 12 freight trains per day running on each kilometre of main track. LISEA does not have any freight trains, as its network is 100% high-speed.

Passenger train utilisation tends to be higher in smaller countries with high population density and a wider rail network, e.g. the Netherlands, Switzerland, and Denmark. Like the parameters influencing the share of passenger rail in a country's modal share, utilisation is driven by the prosperity of a country and its citizens, and the status of the rail sector in that country. It furthermore depends on public service obligations in rural areas with low population density and the existence of bottlenecks and congested nodes where all traffic must pass. Utilisation is particularly important for infrastructure managers when it comes to finance. It is decisive both for revenues and expenditures, as public funding decisions are largely based on train activity. On the other hand, wear and tear is accelerated by more intensive use.

Like the modal share in freight transport, the degree of utilisation by freight trains highly depends on logistical circumstances, such as availability of suitable transshipments centres and smooth interconnections. The European Commission has set out in the Sustainable and Smart Mobility Strategy its intention to promote intermodal transport. Ultimately all transport modes for freight must come together via multimodal terminals. The European Commission will take initiatives to ensure that EU funding, and other policies, including R&I support, be geared better towards addressing these issues[30]. Punctuality and plannability are decisive factors for freight clients. Improving performance in freight train punctuality might also increase the willingness of companies to shift their goods to rail.

[30] COM/2020/789 final: Sustainable and Smart Mobility Strategy – putting European transport on track for the future. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0789&from

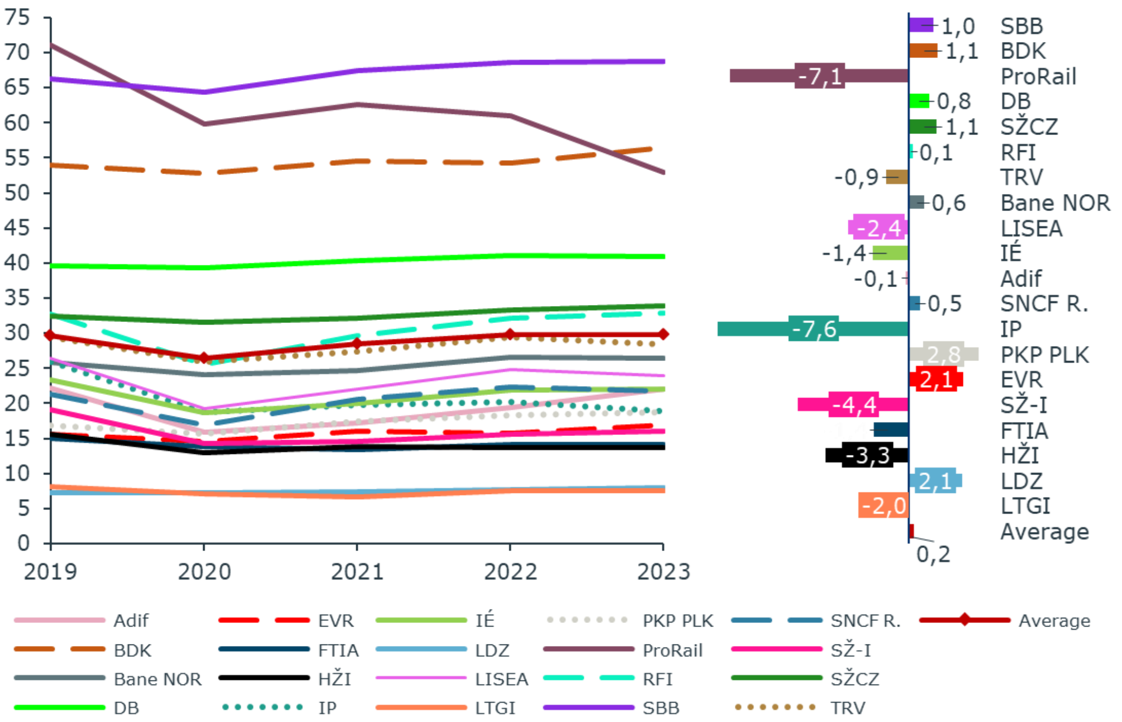

Figure 16: Degree of network utilisation – passenger trains (Daily passenger train-km per main track-km) and CAGR (%) in 2019-2023

The time series data in Figure 16 - Figure 18 on network utilisation passenger traffic clearly illustrate the impacts of the Covid-19 pandemic between 2020 and 2022. At the onset of the pandemic, countries introduced strict national and international travel bans, lockdowns, and mandatory mask measures, which in some cases persisted until 2022. These measures not only directly affected rail transport usage but also led to more indirect, long-term changes in mobility behavior. For example, reliance on public transport initially decreased, while regional and commuter services experienced shifts in commuting patterns as more people transitioned to working from home.

The progression of the pandemic's impact is evident in Figure 16, which shows a significant decline in train traffic in 2020. Traffic levels remained low throughout 2021 and only began to recover in 2022 reaching by 2023 pre pandemic level in almost all countries.

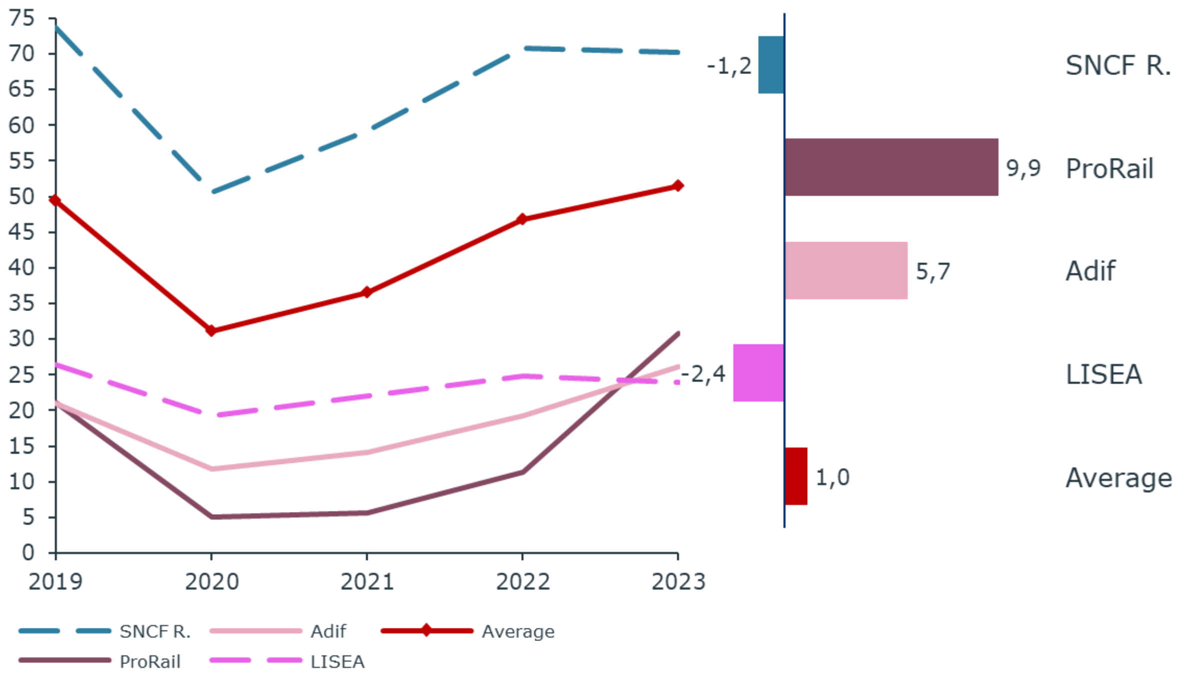

Figure 17: Degree of network utilisation – passenger trains – high-speed (Daily passenger train-km per high-speed main track-km (>200km/h)) and CAGR (%) in 2019-2023

The development of high-speed train activity is illustrated in two graphs: Figure 17 relates to network size (main track-kilometres), and Figure 18 shows absolute figures, reflecting the full train volume managed by the relevant infrastructure managers.

The impacts of the pandemic were even more pronounced for high-speed trains compared to conventional trains. Train activity on high-speed lines dropped on average by one-third between 2019 and 2020, as railway undertakings operating high-speed services drastically reduced their supply for market-driven reasons during this period.

However, high-speed train activity demonstrates a rapid recovery. Notably, Pro-Rail Adif significantly increased their train activity starting in 2021 and in 2023 surpassed pre-pandemic levels. This reflects a growing demand for long-distance travel and underlines high-speed rail as a competitive alternative to aviation. Adif's remarkable average annual growth is largely attributed to the liberalisation of high-speed rail traffic, which began in 2020. This process has led to greater capacity, the introduction of new train operators, and increased service frequencies.

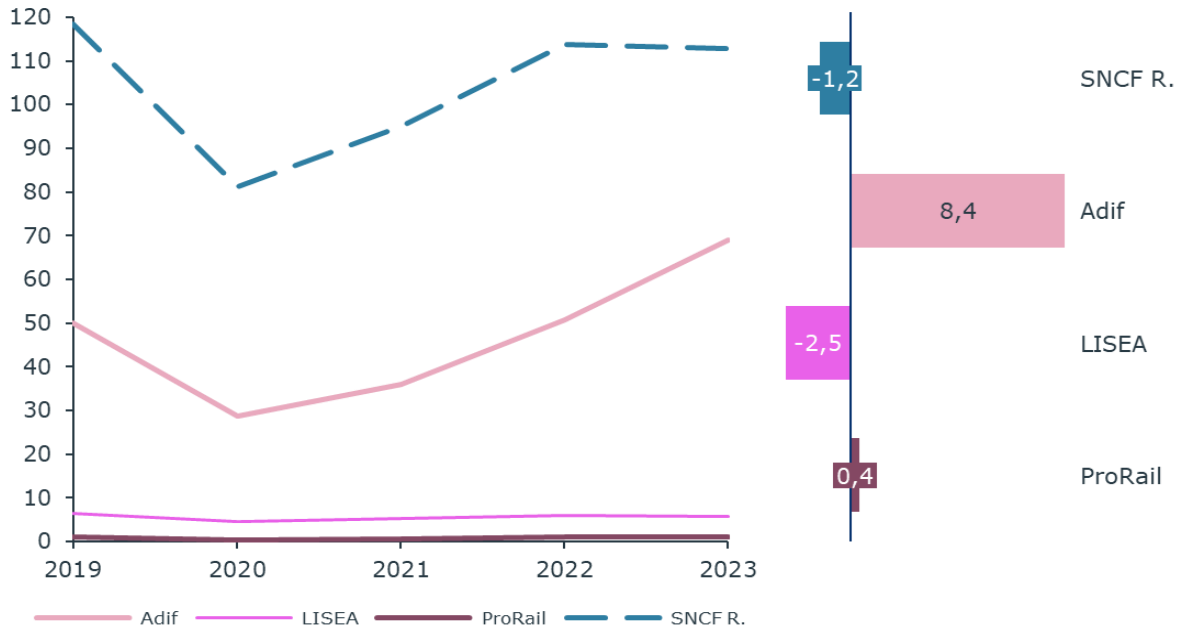

Figure 18: Total passenger high-speed train-km (≥ 200 km/h) (Million train-km) and CAGR (%) in 2019-2023

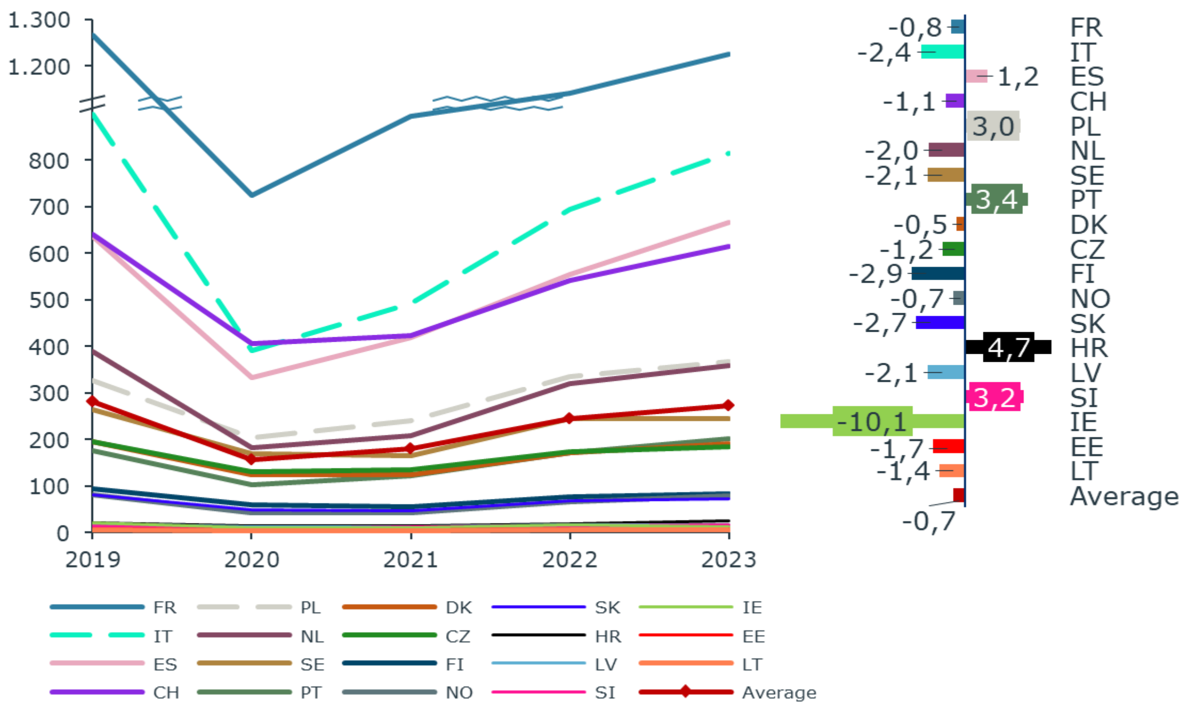

Figure 19: Passengers transported by rail (Number) and CAGR (%) in 2019-2023[31]

[31] Source: Eurostat.

When examining passenger volumes, the data also shows a steady recovery, with passenger numbers continuing to increase since 2020 (Figure 19). However, in the observed countries, passenger volumes have not yet fully returned to pre-pandemic levels. Only five countries report an increase in passenger numbers. In Portugal, this growth is likely linked to the introduction of a new fare system in 2019, which significantly reduced travel costs and triggered a notable surge in demand.

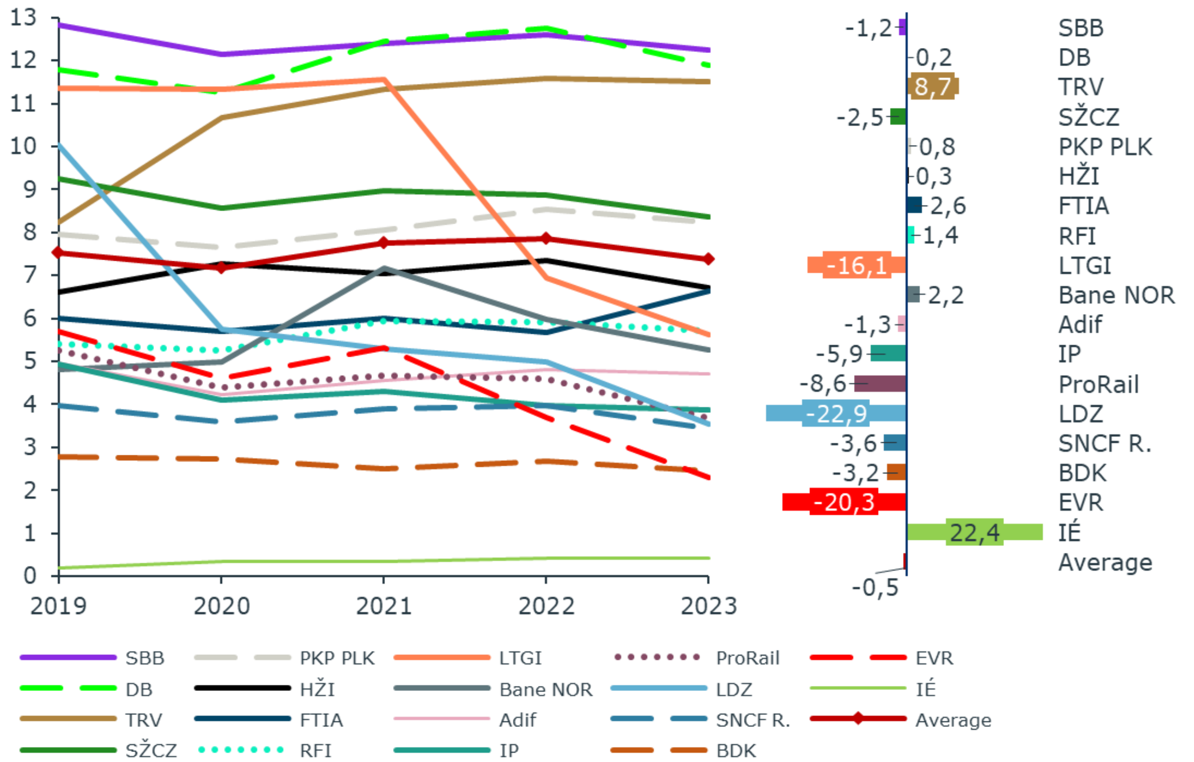

Figure 20: Degree of network utilisation – freight trains on non-high-speed network (Daily freight train-km per main track-km) and CAGR (%) in 2019-2023

Figure 20 and Figure 21 shows the freight train utilisation and freight volume.

When looking at freight train utilisation, the impact of the Russian war against Ukraine that started in February 2021 is clearly reflected. Particularly, the Baltic countries have experienced a significant reduction in freight train activity. Although these developments are not new, because of the political relations with Russia, they have significantly accelerated in 2022. The only infrastructure managers with an increase in freight train activity are IE (however still at a lower level) and Trafikverket with an increase of 8.7%.

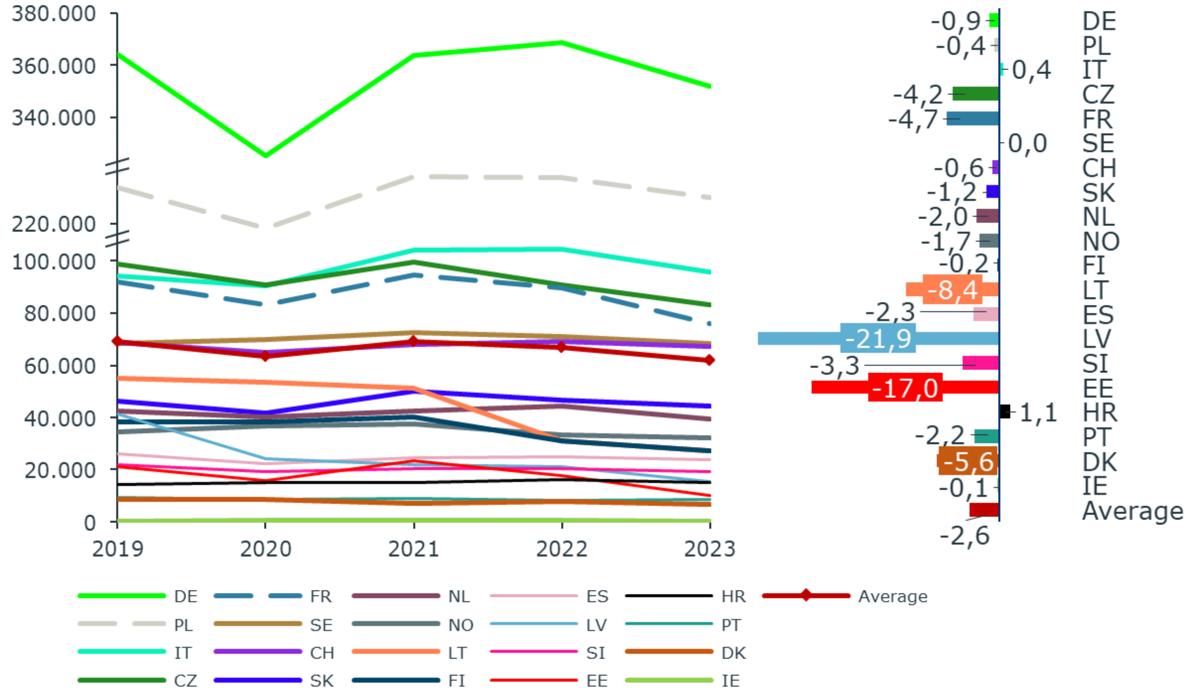

Figure 21: Goods transported by rail (Thousand tonnes) and CAGR (%) in 2019-2023[32]

Another important indicator to look at is the freight volume, measured by the total volume of goods transported by rail. The graphs reflect similar results to freight train activity. Almost all infrastructure managers show an annual decreasing trend, with the average growth rate across the peer group being negative at -2.6%.

[32] Source: Eurostat.

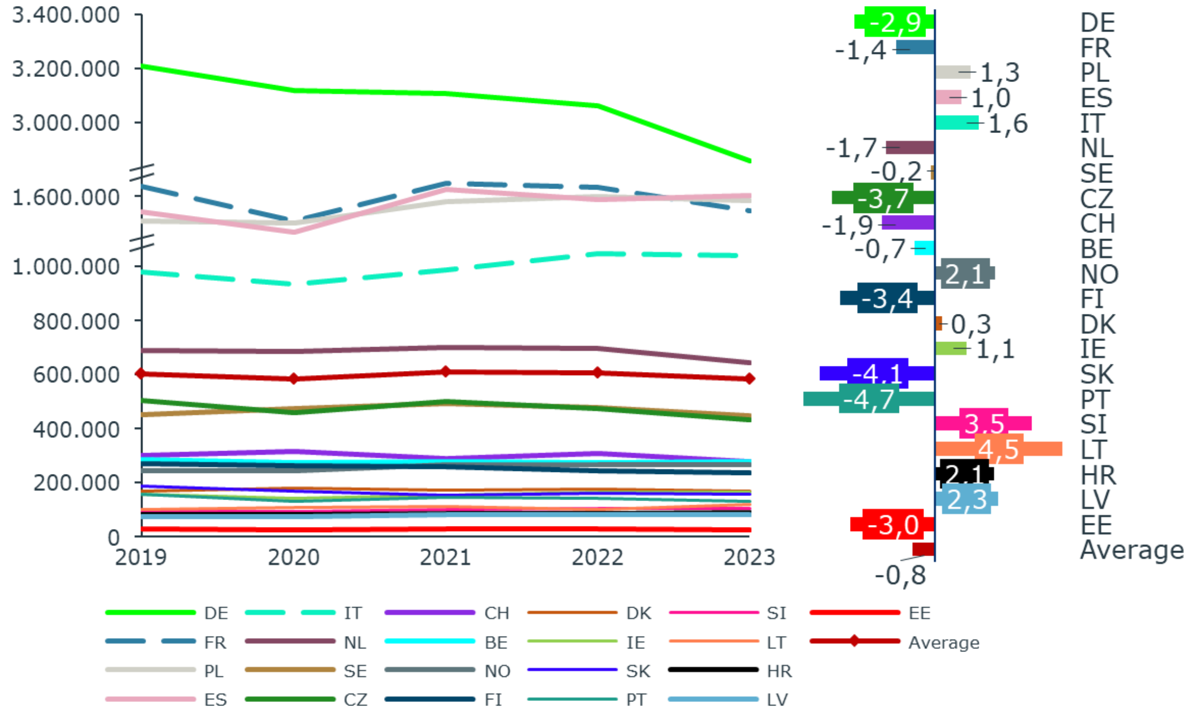

Figure 22: Goods transported on road (Thousand tonnes) and CAGR (%) in 2019-2023[33]

Figure 22 shows the trends in the volume of goods transported by road. Similar to rail, road freight is also experiencing a decline in volume. A comparison with the weighted averages still reveals a larger decline for rail (-2.6%) compared to road (-0.8%). However, unlike rail, where almost all countries show a decline, some countries demonstrate an average increase in transported road freight volume.

3.2 Financial

3.2.1 Summary of finance

EU-wide objectives

- Railway infrastructure requires substantial amounts of funding to cover capital and operating expenditures. Providing value for money is paramount as funding is constrained, and infrastructure managers are constantly improving their asset management activities to achieve this objective.

[33] Source: Eurostat.

EU-wide objectives

- The European infrastructure managers apply different financing and funding structures and rely on combinations of public funding, access charges and commercial revenues.
- EU legislation aims at increasing the transparency of funding arrangements and developing appropriate incentives to ensure the best available use of existing assets and capacity.
- Directive 2012/34/EU, establishing a single European railway area[34], requires:
  - rail undertakings and infrastructure managers to maintain separate accounts
  - the expenditure (under normal business conditions and over a period not exceeding five years) and the infrastructure managers' income from different sources (including access charges and state funding) to be balanced.
- It also sets out a framework for determining charges, establishing the principle that the charges paid to operate a train service must cover the direct cost incurred because of such operation while allowing for additional mark-ups and charges to recover fixed costs and address externalities.

Peer group's performance

- In 2023, the average operational expenditures stand at EUR 127 000 per main track-kilometre, with a range spanning from EUR 50 000 to EUR 185 000.
- The average capital expenditures for 2023 are EUR 171 000 per main track-kilometre, with figures varying between EUR 6 000 and EUR 312 000.
- Both operational and capital expenditures have seen notable growth from 2019 to 2023, rising by 19% and 43%, respectively.
- However, when adjusted for inflation, operational expenditures have actually decreased by 6% in real terms, while capital expenditures have continued to rise by 14% in real terms.
- In recent years, the share of TAC revenues in total revenue has decreased for most infrastructure managers, dropping on average from 76% to 70%.

[34] Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area Text with EEA relevance. http://data.europa.eu/eli/dir/2012/34/oj

- After a decline in 2020, TAC revenues have been on the rebound, surpassing pre-pandemic levels by 3%. Yet, once inflation is factored in, TAC revenues in 2023 are still 19% lower than in 2019.
- Total public funding for infrastructure managers has been on an upward trajectory since 2019, with the 2023 figure showing a 46% increase compared to 2019. When adjusted for inflation, however, this increase shrinks to 23%.

3.2.2 Development and benchmark of finance

Rail infrastructure requires a significant amount of funding which is dedicated to building new infrastructure, replacing existing assets, as well as maintaining and operating the asset base. The financial chapter covers important elements related to expenditures and revenues of infrastructure managers.

Rail financing indicators

PRIME members report four indicators measuring costs and six indicators measuring revenues:

- Costs:
  - Operational expenditures
  - Capital expenditures
  - Maintenance expenditures
  - Renewal expenditures
- Revenues:
  - Proportion of TAC in total revenue
  - Total track access charges
  - Non-access charges
  - Total public funding
  - Public funding for operational expenditures
  - Public funding for capital expenditures

To increase comparability of these values among infrastructure managers, the expenditure-figures are related to main track-kilometres. The revenues from track access charges are related to main track-kilometres, train-kilometres, and the monetary value. Non-access charges and public funding are related to main track-kilometres.

3.2.3 Costs

The costs category includes relevant costs incurred by the infrastructure manager, broken down into useful and comparable sub-categories. It includes all operating, capital and investment costs. For purposes of comparison, costs are adjusted to reflect local costs using purchasing power parities[35] (PPPs). The costs incurred by an infrastructure manager are dependent on several factors, some lie within and some outside the responsibility of an infrastructure manager.

A significant external factor is inflation, which can considerably impact costs over time and is beyond the control of the infrastructure manager. In the 2020s, Europe experienced notable inflationary pressures, driven by a combination of factors such as supply chain disruptions, rising energy prices, and geopolitical tensions. These dynamics led to higher costs for materials, labor, and other essential inputs, creating challenges for infrastructure managers in maintaining performance.

It is crucial to put cost developments into context by adjusting for inflation. This allows for a clear distinction between increases attributable to general price level changes and those reflecting real-term cost growth. Such an approach ensures a more accurate understanding of the underlying cost drivers and provides a comparability between years.

Since the scope of this report spans from 2019 to 2023, 2019 has been chosen as the base year for inflation adjustment. Values from 2020 to 2023 have been adjusted to 2019 price levels using the inflation index for Construction Producer Prices or Costs for New Residential Buildings (Eurostat)[36], which best represents the cost structure of infrastructure managers.

The figures from Figure 23 to Figure 34 show the compositions of the operational and capital expenditures of the PRIME members over the period 2019-2023. Each expenditure type is presented in multiple diagrams, both with and without inflation adjustment, to illustrate the nominal values and the values in real terms (inflation adjusted).

[35] Source: Eurostat, Actual individual Consumption, status 01.2025. Please note that the PPP values for 2021 and 2022 are preliminary and may be revised in the next data release periods of Eurostat.

[36] Eurostat: Construction producer prices or costs, new residential buildings https://ec.europa.eu/eurostat/databrowser/view/sts_copi_a$defaultview/default/table

Operational expenditures

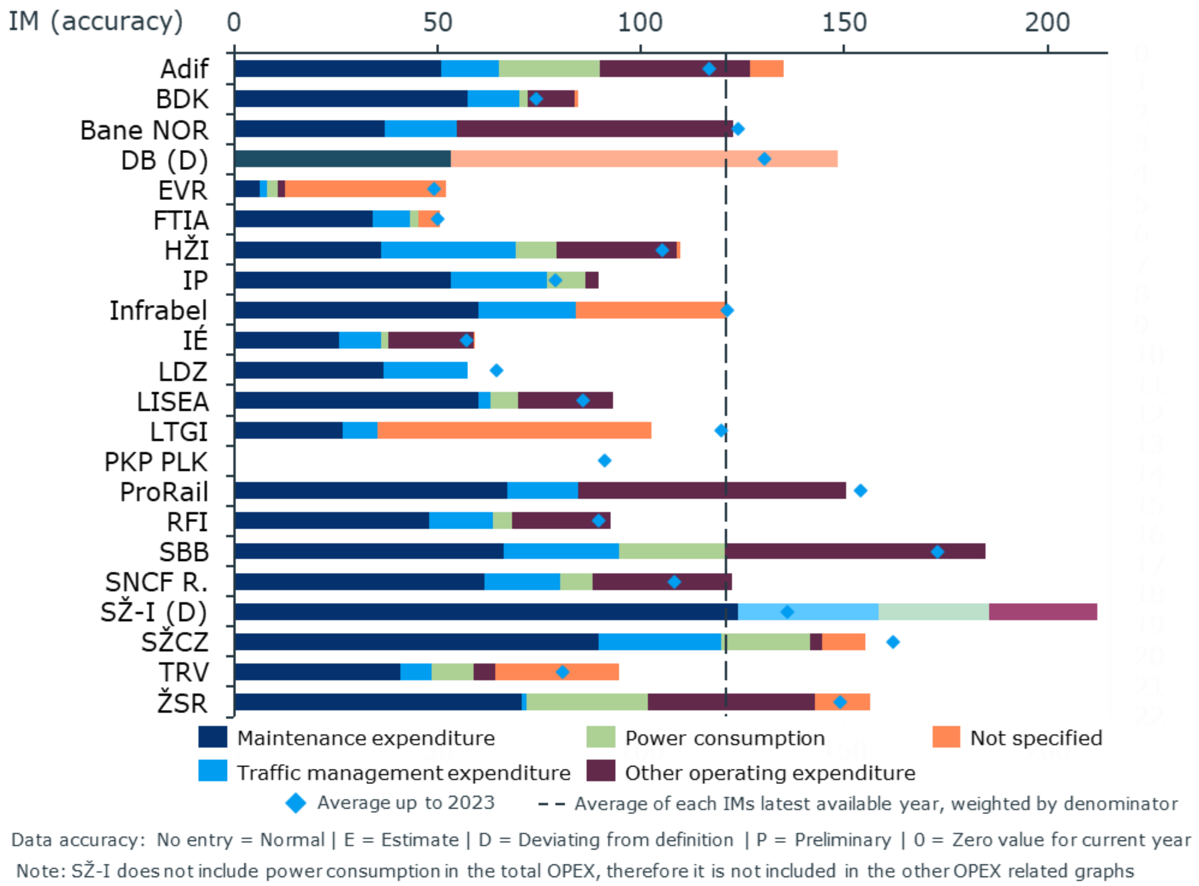

Figure 23: Detailed composition of OPEX in relation to network size (EUR 1 000 per main track-km)

Figure 23 shows the composition and the level of operational expenditures in 2023. Maintenance costs refer to non-capital expenditures undertaken by the infrastructure manager to maintain the current condition and capacity of the existing infrastructure or to optimize asset longevity. Traffic management expenses comprise the oversight of signalling systems and traffic flow, including planning and track allocation. Financial expenditures, as recorded in the annual profit and loss statement, encompass interest and related charges that are tied to the returns of specific financial assets such as deposits, bills, bonds, and loans. Power consumption costs arise from the energy used by the infrastructure manager. Other operating costs include operational expenditures that are included in total OPEX but cannot be attributed to the individual categories. The not specified category includes the costs that remain after deduction of the various sub-categories from the total operational expenditures[37].

[37] Other operating expenditures" is stated as such by the infrastructure managers, while the "not specified" category is calculated from total OPEX (not specified = total OPEX - all other indicated categories). This distinction is made to also allow infrastructure managers to be included in the graph which cannot attribute their expenses to the different categories.

Maintenance and traffic management expenditures are the largest categories, while costs related to finance and power consumption make up a smaller part. The level of total operational expenditures varies between EUR 50 000 – EUR 185 000[38] per main track-kilometre per year and shows an overall dispersion of values of EUR 40 000. On average, infrastructure managers' annual operational expenditures amount to EUR 127 000 per main track-kilometre.

SNCF R. indicated that station activities are managed independently by a new subsidiary, managing their own expenses and thus not being included in the total OPEX. SBB's costs assigned to "other operating expenditures" are generated by activities related to other income, i.e. shunting yard operations and by project-related, non-depreciable activities (see Figure 45 as counterpart: total revenues from non-access charges).

Operational costs are driven by a range of different factors. The size and complexity of the networks are just as relevant as train utilisation. For example, a network with a relatively large number of switches and a high degree of electrification and level crossings is more prone to failures and requires more interventions. Tunnels and bridges must not only be checked more regularly, but also entail more costly and sophisticated replacements and repairs. Busy tracks are subject to higher wear and tear. Condition and age of the assets are also relevant: investments that have been made in the past pay off and reduce operational costs later. Besides maintenance, operational expenditures also include functions of traffic management. The services provided by the infrastructure manager vary significantly, too. Different technologies and the amount of human resources needed in traffic management determine the level of these expenditures.

[38] SŽ-I does not include power consumption in the total OPEX.

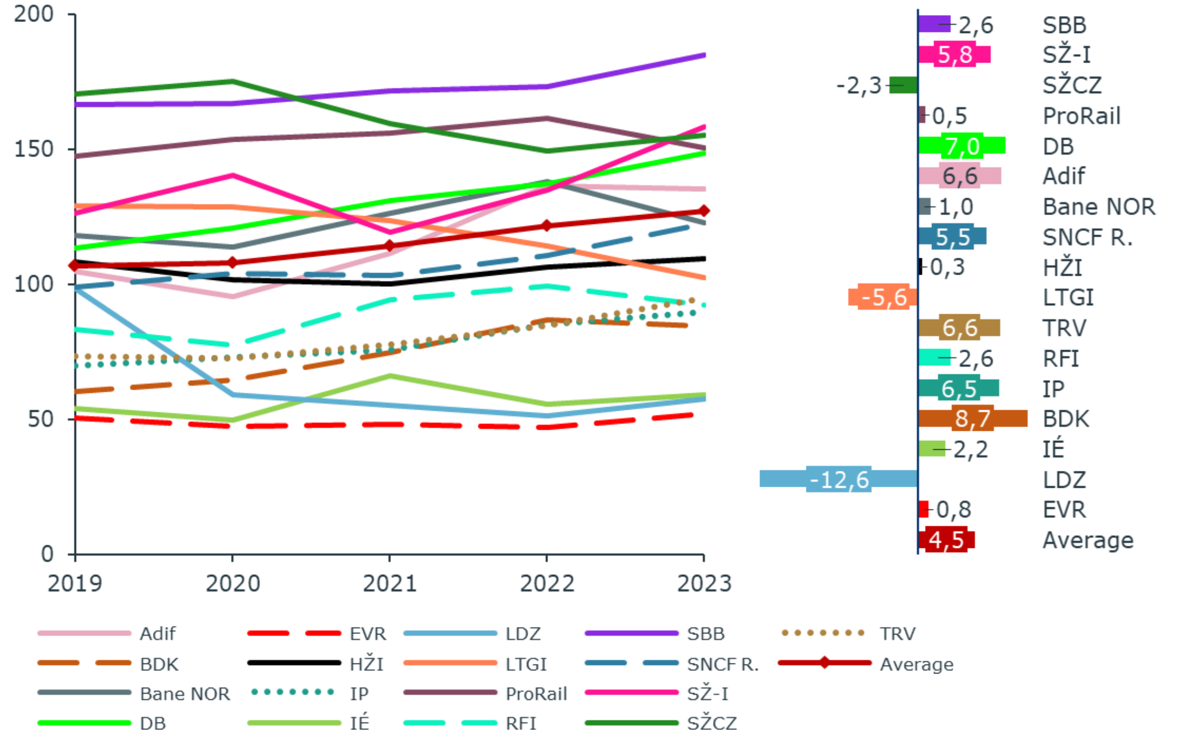

Figure 24: OPEX in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

As can be seen in Figure 24, total operational expenditures show mainly a positive annual growth from 2019 to 2023. The highest annual growth is reported by BDK and DB. LDZ's operation costs on the other hand reduced more than 40% within 5 years. OPEX of RFI in 2023 was impacted by fluctuations in power consumption expenditures and the inclusion of an extraordinary item in 2023, which resulted in a decrease compared to the previous year.

For a comprehensive understanding of this growth (and the development of other financial indicators), one must consider the current global and European economic conditions, which are characterised by significant inflation. Looking at the EU's import prices for the total industry reveals a dynamic movement in the investigation period between 2019 and 2023. During the initial phase of the COVID-19 pandemic, import prices, particularly for goods coming from outside the eurozone, experienced a sharp decline. However, prices began to rise again in the latter half of 2020. The years 2021 and 2022 saw a dramatic increase due to supply chain disruptions and Russia's war against Ukraine, reaching a peak in summer 2022. Although there has been a notable downward trend in prices since that peak, they remain substantially higher than pre-pandemic levels, showing a price increase of 29.3% between 2019 and 2023 for railway relevant costs[39].

[39] Calculation based on Eurostat: Construction producer prices or costs, new residential buildings https://ec.europa.eu/eurostat/databrowser/view/sts_copi_a$defaultview/default/table

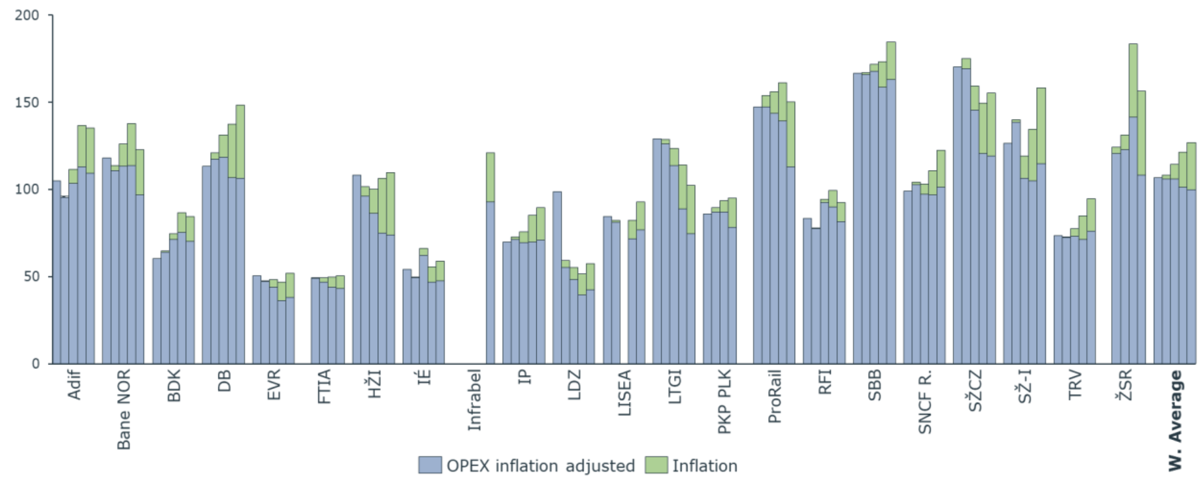

Figure 25: Inflation adjusted OPEX in relation to network size (EUR 1 000 per main track-km) in 2019-2023

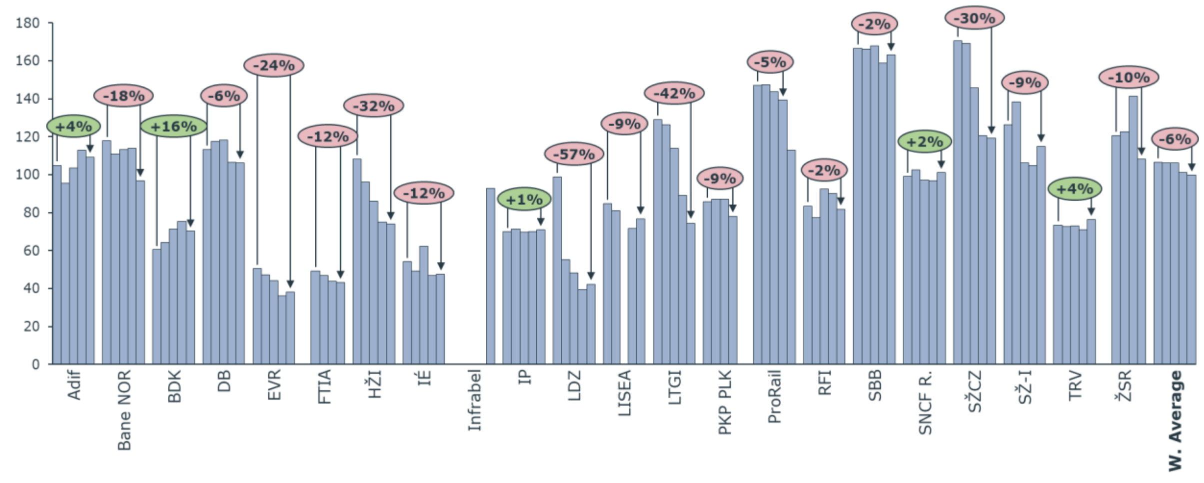

Figure 26: Inflation adjusted OPEX in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis presents a contrasting picture compared to the analysis that does not account for inflation. Average operational expenditures within the peer group increased nominally by 19% from 2019 to 2023. However, when adjusted for inflation to 2019 price levels, the 2023 average was 6% lower than the 2019 average (Figure 26). This indicates that the real-term operational expenditures of infrastructure managers have decreased. Only five IMs have recorded an increase in real terms, from which BDK had the highest real growth by 16%. LTGI, LDZ, and SŽCZ experienced the highest real decreases, with declines exceeding 30%.

Capital expenditures

According to the PRIME KPI & Benchmarking subgroup's definition, capital expenditures are funds used by a company to acquire or upgrade physical assets such as property, industrial buildings, or equipment. An expense is considered a capital expenditures when the asset is a newly purchased capital asset or an investment that improves the useful life of an existing capital asset. Hence, it comprises investments in new infrastructure as well as renewals and enhancements.

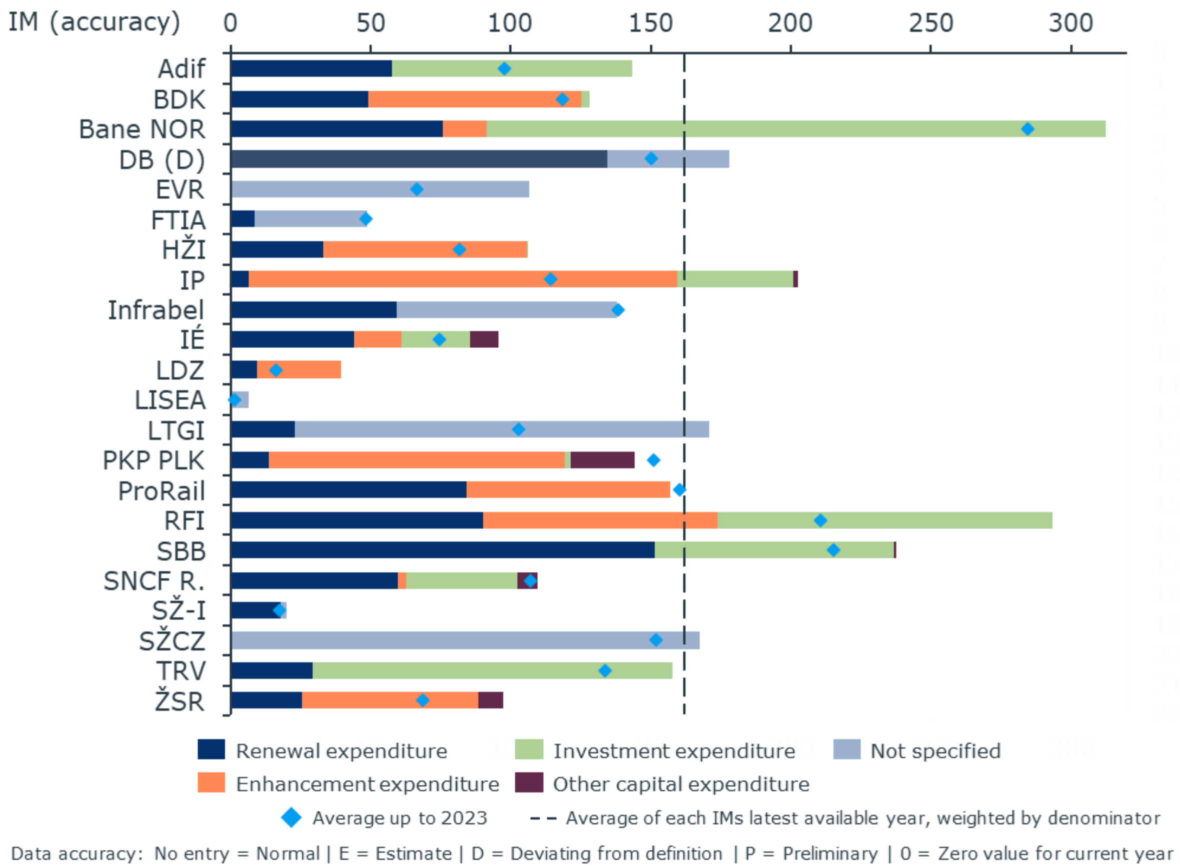

Figure 27: Composition of CAPEX in relation to network size (EUR 1 000 per main track-km)

Figure 27 shows different components of capital expenditures in 2023. Similarly, to the components of OPEX, infrastructure managers face challenges in clearly allocating expenditures, as the accounting systems between member states differ. Furthermore, it is difficult to always distinguish between enhancement and investment clearly, as enhancement often comes along with new functionalities much like investments. For better understanding below a brief overview of the categories:

Investment in new infrastructure encompasses capital expenditures on constructing new installations for new lines, including the processes of planning, tendering, dismantling old equipment, construction, testing, and commissioning for full-speed operation.

Renewals refer to capital expenditures for substantial replacement projects on existing infrastructure that maintain its original performance level, typically involving the systematic replacement of entire systems or components at their life's end.

Enhancements, or upgrades, represent capital expenditures on significant modifications to existing infrastructure that boost its overall performance, often initiated by new functional requirements or regulatory mandates, rather than asset lifetimes.

The category "not specified" includes the costs that remain after deduction of the various sub-categories from the total capital expenditures.

The development and diversity of capital expenditures is expectedly more dynamic compared to the operational expenditures. In total, the annual capital expenditures vary between EUR 6 000 – 312 000 per main track-kilometre. On average EUR 171 000 per main track-kilometre per year is spent on capital expenditures, the standard deviation in the peer group is EUR 78 000. LISEA's capital expenditures is close to zero as its infrastructure has a low average age.

The largest share, almost 35%, is accounted for by expenditures on renewals, where SBB's expenditures (EUR 151 000) are the highest and more than double of the average. The highest investments are reported by Bane NOR with a value of almost EUR 221 000. Bane NOR's high investments have been the result of strong political commitment to go greener, invest more into railways and include several projects concerning ERTMS development (e.g. preparatory works, installed systems at Nordlandsbanen and Gjøvikbanen, remodeling trains). Further the capacity of the network was increased (e.g. Bergensbanen with more double tracks, modernized freight terminal, and new tunnel construction), as well as some other projects.

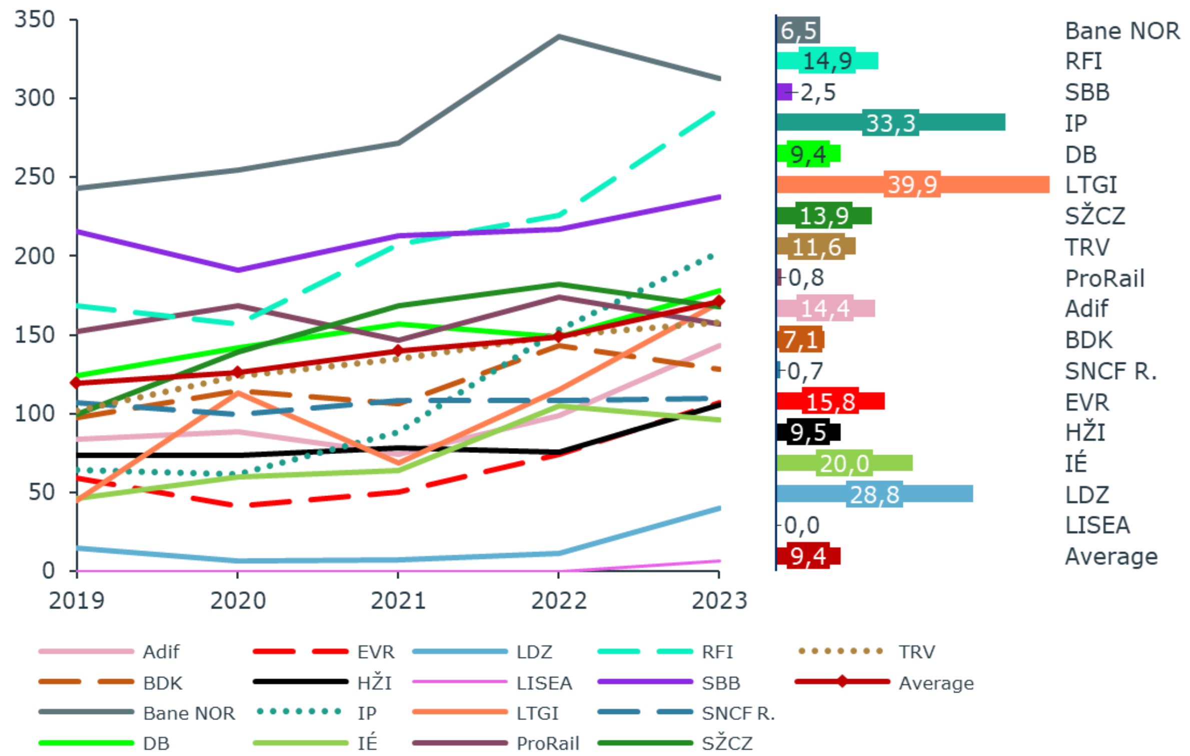

Figure 28: CAPEX in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

As capital expenditures are often linked to major (re-)investment programs it is not surprising that expenditure levels fluctuate over time. The individual annual growth rates of the infrastructure managers range from 0% to 40%, with most infrastructure managers showing a positive growth resulting in an average of +9.4%. The highest increase in investment-related expenditures was recorded by LTGI, which spent nearly four times as much in 2023 as in 2019. Also IP is undertaking significant investments in the Portuguese railway network—constructing, enhancing, and renewing infrastructure through 2023—resulting in the second-highest growth rate of capital expenditures within the peer group.

Like operational costs, capital expenditures also increase with higher network complexity. High numbers of switches, signalling and telecommunication assets increase the cost of renewals. Network complexity, in turn, is in part determined by geographic conditions.

The level of capital expenditures is highly dependent on the budget and funding agreements between infrastructure managers and national governments. In particular renewals of rail infrastructure require long term planning, reflecting the long-lived nature of the assets and the need for a whole-life approach to asset management. Longer funding settlements provide more stability regarding financial and project planning and enable larger investments projects. In terms of public funding the eligibility for the EU Cohesion Fund is particularly important for Central and Eastern European countries, as EU cohesion policy-related financing is one of the major sources of funding, especially modernisation projects such as ERTMS, railway electrification etc. The condition and age of the asset also influences the need for renewals and asset improvement. The supplier market, prices and resources determine the level of activities achievable with the budgets provided.

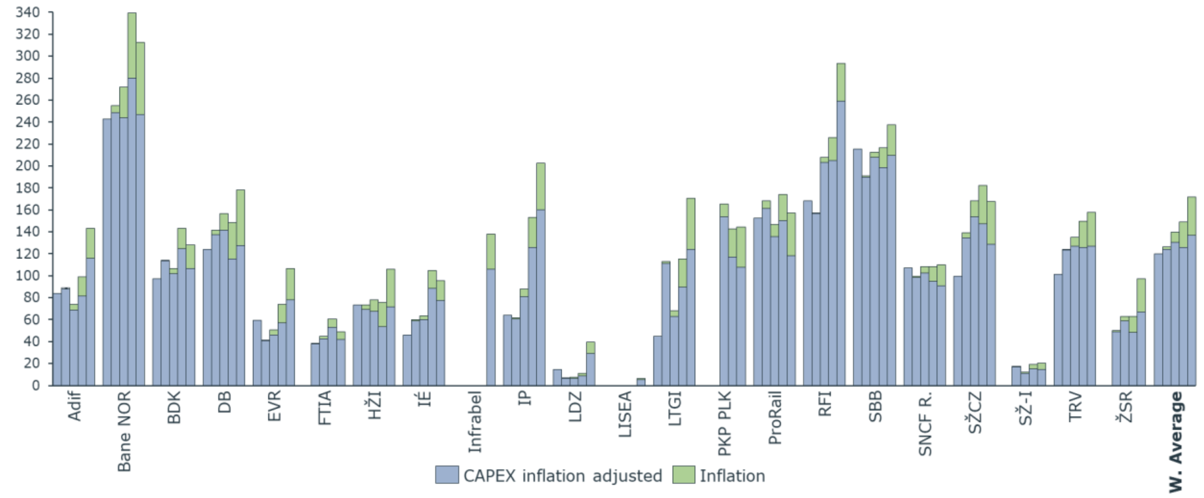

Figure 29: Inflation adjusted CAPEX in relation to network size (EUR 1 000 per main track-km) in 2019-2023

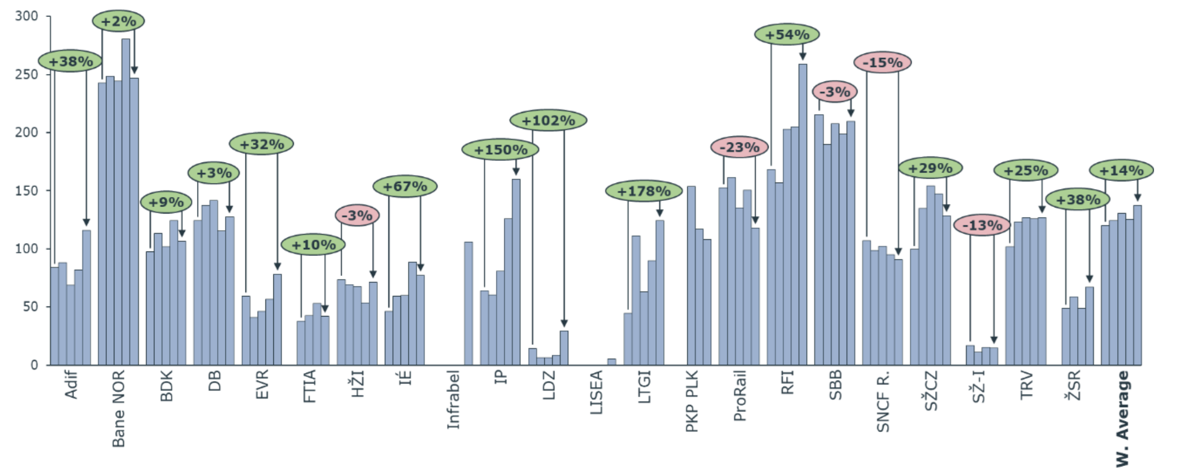

Figure 30: Inflation adjusted CAPEX in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis once again presents a differing, though not contrasting, perspective compared to the analysis that does not account for inflation. Average capital expenditures within the peer group increased by 43% from 2019 to 2023. When adjusted for inflation to 2019 price levels, the 2023 average was only 14% higher than the 2019 average (Figure 30). This indicates that a substantial portion of the increase in capital expenditures was driven by inflation with growth in real terms however not insignificant for capital expenditures. Only five IMs have experienced a decrease in real terms, from which ProRail had the highest real decline by 23%. In contrast, LTGI, IP, and LDZ recorded the highest real increases, each exceeding 100%, meaning their CAPEX more than doubled in real terms.

Maintenance and renewals

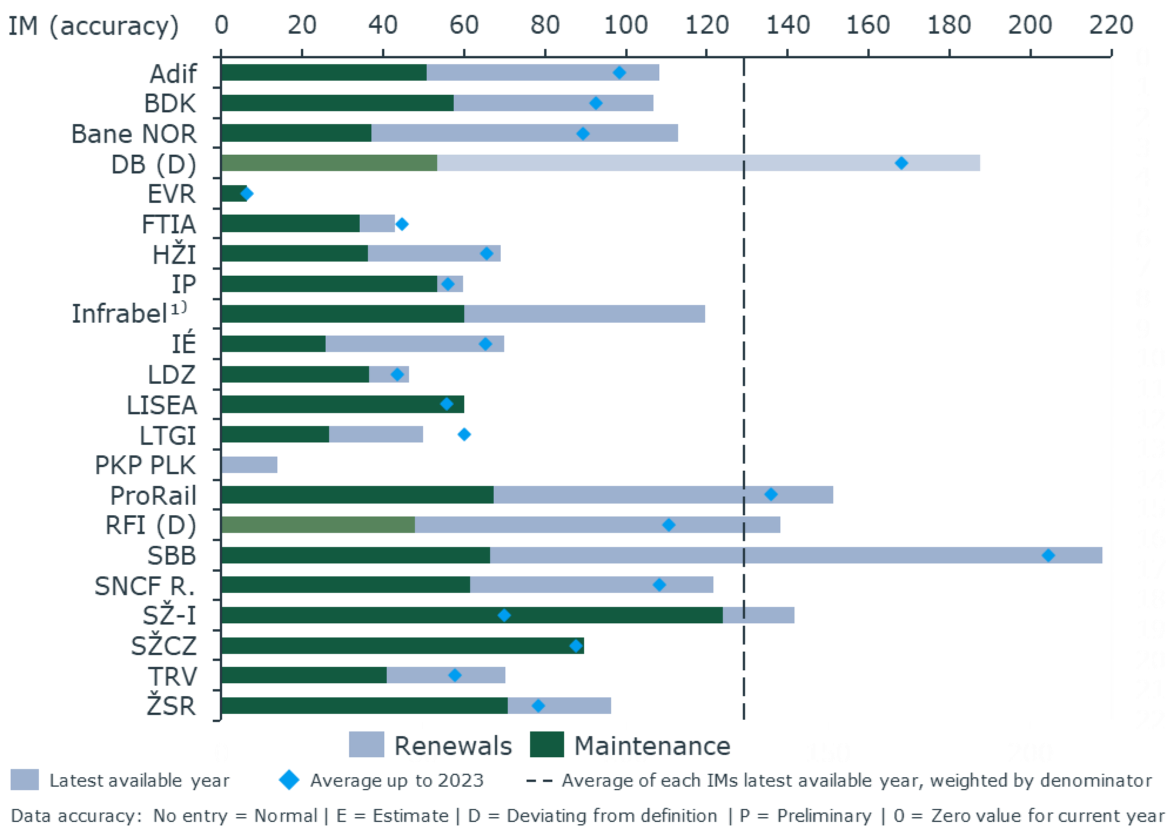

Figure 31: Maintenance and renewal expenditures in relation to network size (EUR 1 000 per main track-km)

Figure 31 provides a snapshot of current maintenance (component of OPEX) and renewal expenditures (component of CAPEX) in 2023. On average infrastructure managers spend EUR 129 000 per main track-kilometre per year on maintenance and renewal. SBB, DB, and ProRail have the highest expenditures on maintenance and renewals with over EUR 140 000 per main track-kilometre. The differing spread of OPEX and CAPEX amongst infrastructure managers is also interesting to look at: while maintenance shows a standard deviation of EUR 27 000, renewals have a spread in data distribution of EUR 42 000.

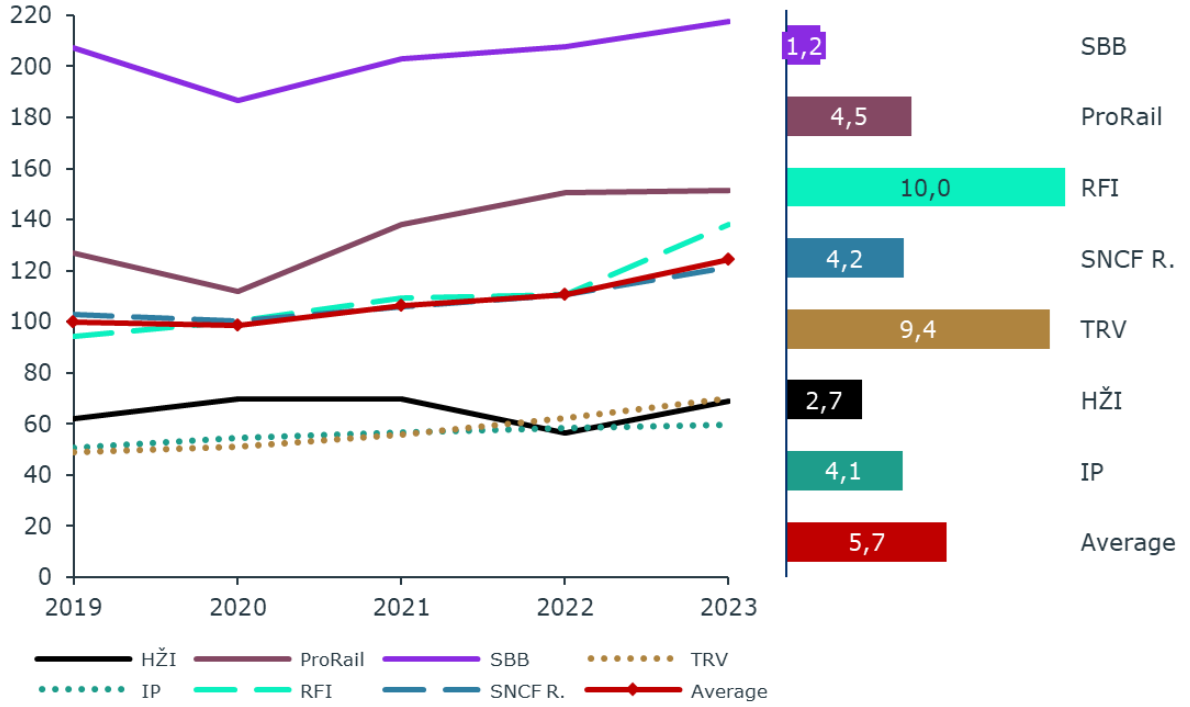

Figure 32: Maintenance and renewal expenditures in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

The time series graph of maintenance and renewal is mirroring the development of the previous charts. All infrastructure managers increased their expenditures in the observed period, with an average CAGR of 5,7%. The highest average increase can be seen at RFI with an annual growth of 10%.

Like operational and capital expenditures, also maintenance and renewal costs are driven by the following factors: network complexity/asset densities (e.g. switches, bridges, tunnels…), network utilisation and the condition of assets.

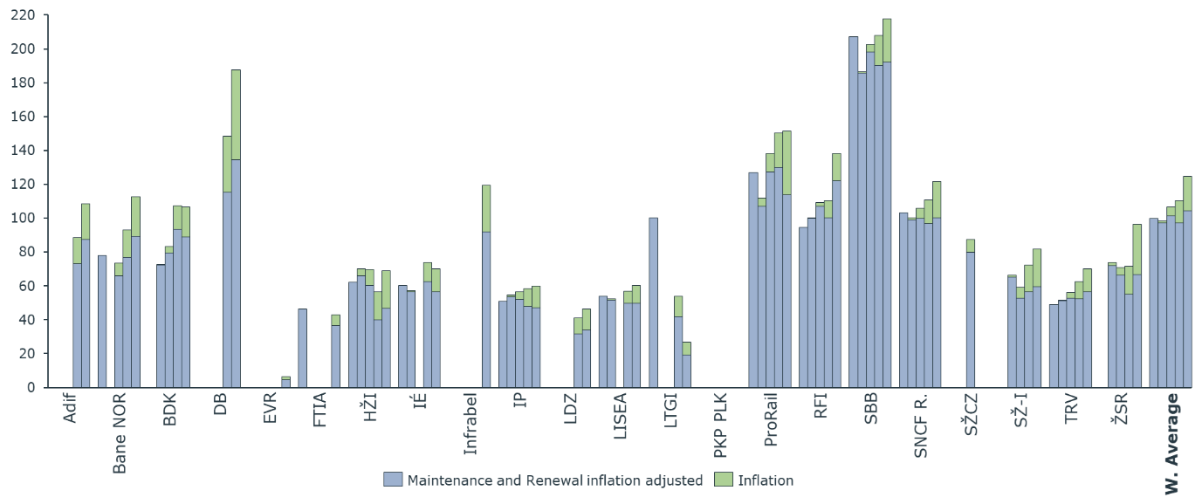

Figure 33: Inflation adjusted maintenance and renewal expenditures in relation to network size (EUR 1 000 per main track-km) in 2019-2023

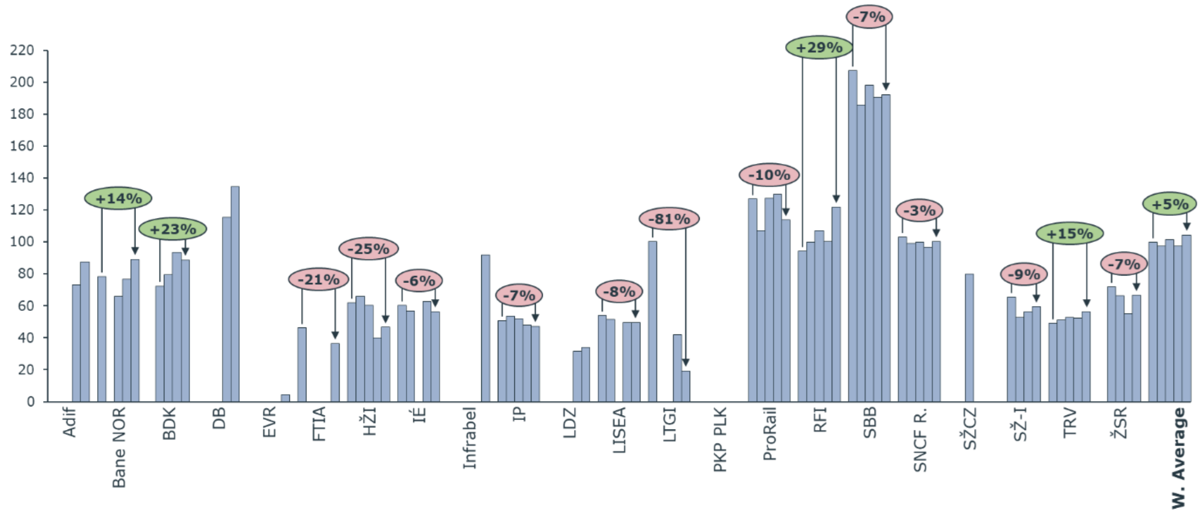

Figure 34: Inflation adjusted maintenance and renewal expenditures in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis provides a nuanced perspective compared to the non-adjusted analysis. Within the peer group, average maintenance and renewal expenditures increased by 25% from 2019 to 2023. However, after adjusting for inflation to 2019 price levels, the 2023 average was only 5% higher than the 2019 average (Figure 34). This indicates that a significant portion of increased maintenance and renewal expenditures was attributed to inflation, still a certain real term growth was experienced. Only four IMs have recorded an increase in real terms, from which RFI had the highest real growth by 29%.

3.2.4 Revenues

This category provides an overview of track access charges (TAC) paid by railway undertakings using the railway network and its service facilities. TAC revenues are shown both in relation to network size and to traffic volume, as operators are charged based on the usage of the network which is indicated by the traffic volume. The TAC relation to the network illustrates the TAC revenue in relation to a major cost driver. Additionally, it evaluates and compares non-track access-related revenues generated by infrastructure managers. Finally, public funding received by each infrastructure manager is shown in relation to the network.

To achieve meaningful comparability, the indicators for charging have been simplified, and PRIME is using fundamental KPIs that all infrastructure managers find common and easy to collect. Together with cost related indicators, they provide an indication to what extent infrastructure managers can cover their costs, respectively to what extent they rely on subsidies. For purposes of comparison, national infrastructure managers' revenues are normalized using purchasing power parities[40] (PPPs).

Like expenditures, revenues are analysed in this report, taking inflation into account. The inflation-adjustment of revenues is conducted using the same methodology applied to expenditures[41].

Figures 35 to 52 show the revenue development over the period 2019-2023. Each revenue type is presented in multiple diagrams, both with and without inflation adjustment, illustrating both nominal and real term values.

[40] Source: Eurostat, Actual individual Consumption, status 01.2025. Please note that the PPP values for 2021 and 2022 are preliminary and may be revised in the next data release periods of Eurostat.

[41] Used inflation index: Eurostat, Construction producer prices or costs, new residential buildings https://ec.europa.eu/eurostat/databrowser/view/sts_copi_a$defaultview/default/table

TAC - Track access charges

Figure 35: Proportion of TAC in revenue (grants excluded) (% of monetary value)

Figure 35 shows the proportion of TAC revenues of total revenues: seven infrastructure managers generate less than 50% of their revenues from track access charges, while seven other infrastructure managers generate a share of track access charges of above 80%. LDZ and LISEA generate all their revenues from track access charges (almost 100%). The peer group's average is 71%, the standard deviation is 24%.

Banedanmark states that TAC revenues are fully transferred to the Danish Transport Ministry and therefore do not contribute to Banedanmark's financing directly.

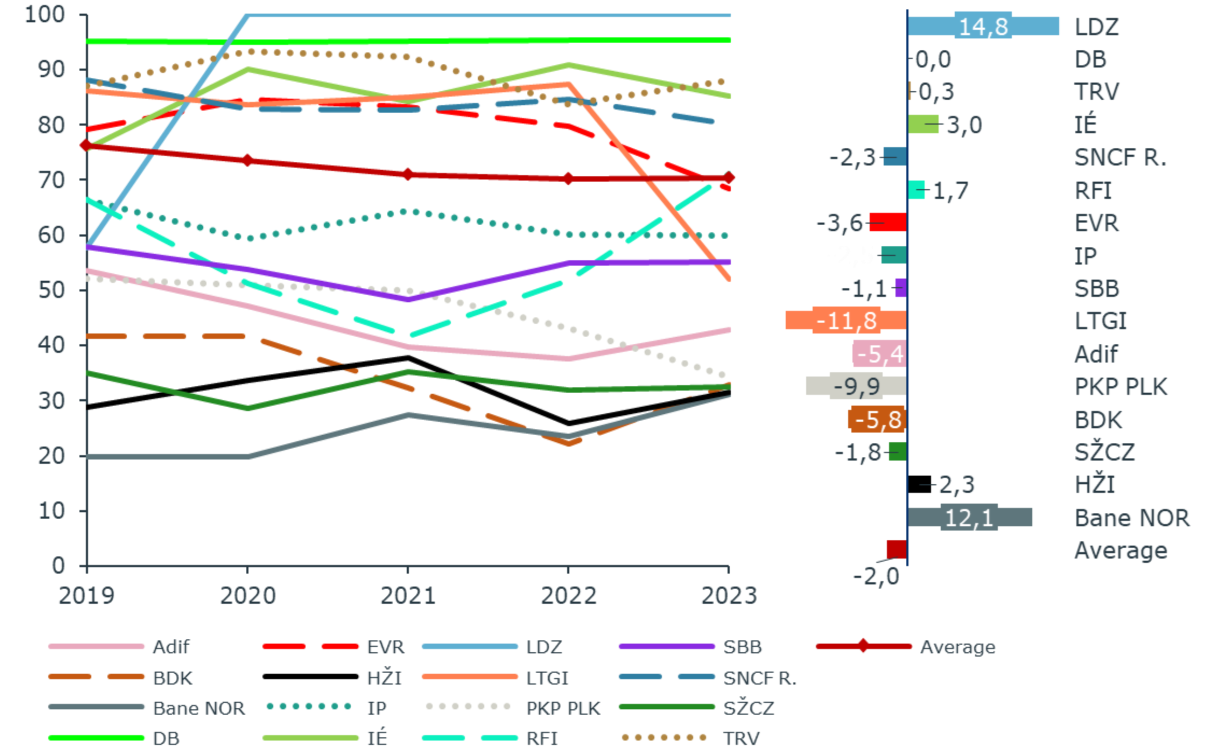

Figure 36: Proportion of TAC in revenue (% of monetary value) and CAGR (%) in 2019-2023

The proportion of revenues from track access charges slightly decreased between 2019 and 2023. Parts of this development can be explained as a consequence of the Covid-19 pandemic, which radically decreased train activity in 2020, which is linked to the earnings from track access charges. The exceptions to the graph are LDZ and Bane NOR, which increase their share over the period observed significantly. LDZ has increased its share of TAC revenue from 60% in 2019 to 100% in 2020, while Bane NOR's share has risen from 20% in 2019 to 31% in 2023.

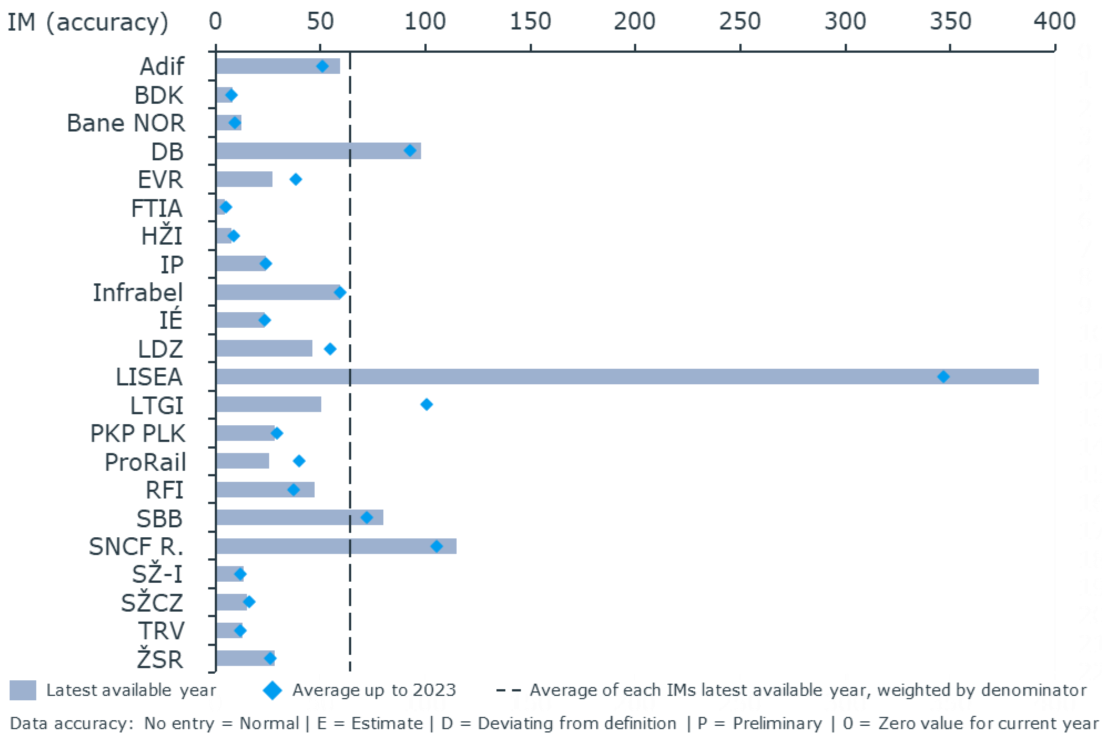

Figure 37: TAC revenue in relation to network size (EUR 1 000 per main track-km)

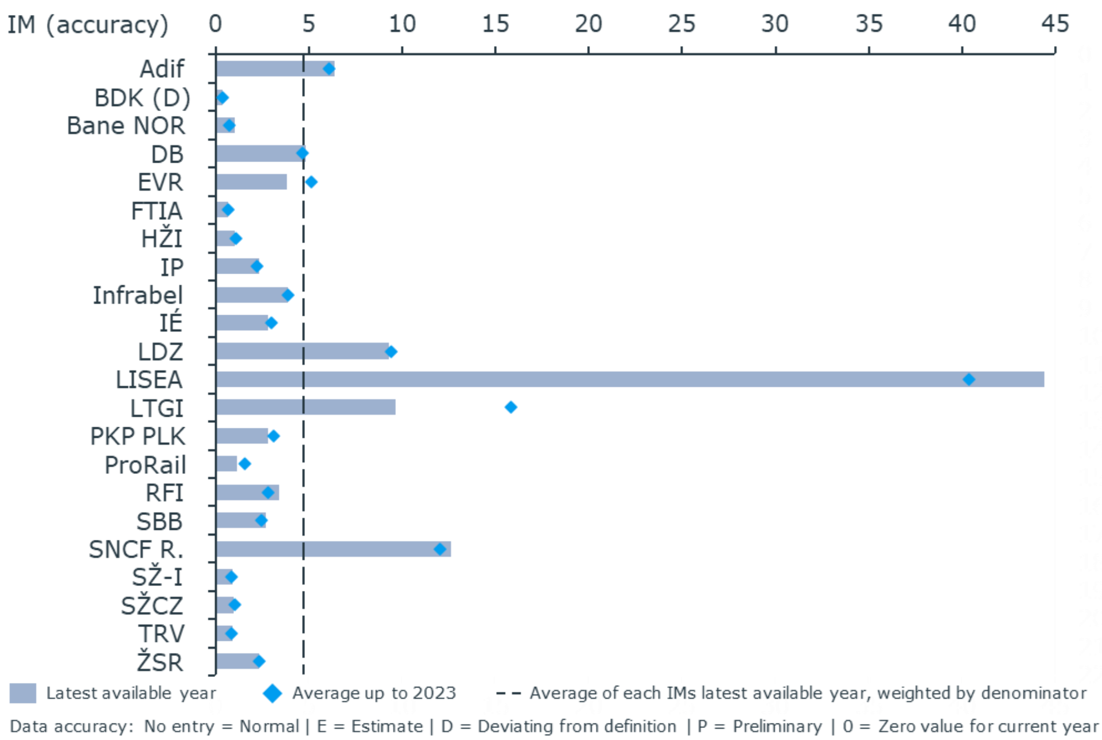

Figure 38: TAC revenue in relation to traffic volume (EUR per total train-km)

Figure 37 illustrates the revenues per track-kilometre and Figure 38 the revenues per train-kilometre as a benchmark. The comparison shows the differences in the extent to which infrastructure managers can generate TAC revenues per train-kilometre on the one hand, and how many TAC revenues per track they have available in relation to their network costs on the other hand. SBB's TAC revenues, for example, are above average in relation to network size, but remain below average when related to traffic volumes, which indicates a high utilisation rate of the network. TAC revenues in relation to network size varies between EUR 5 000 – EUR 392 000 per main track-kilometre per year however most of the infrastructure managers are below the average of EUR 64 000 per main track-kilometre. In relation to traffic volume TAC revenues varies between EUR 0.4 – 44.4, showing an average of EUR 4.7. LISEA's level of income is significantly higher than that of other infrastructure managers because it comes exclusively from the LGV line (high-speed line) while remaining comparable to the charge levels of other LGVs on the French national network. It covers both operation and maintenance costs as well as a large amount to the investments to build high-speed lines.

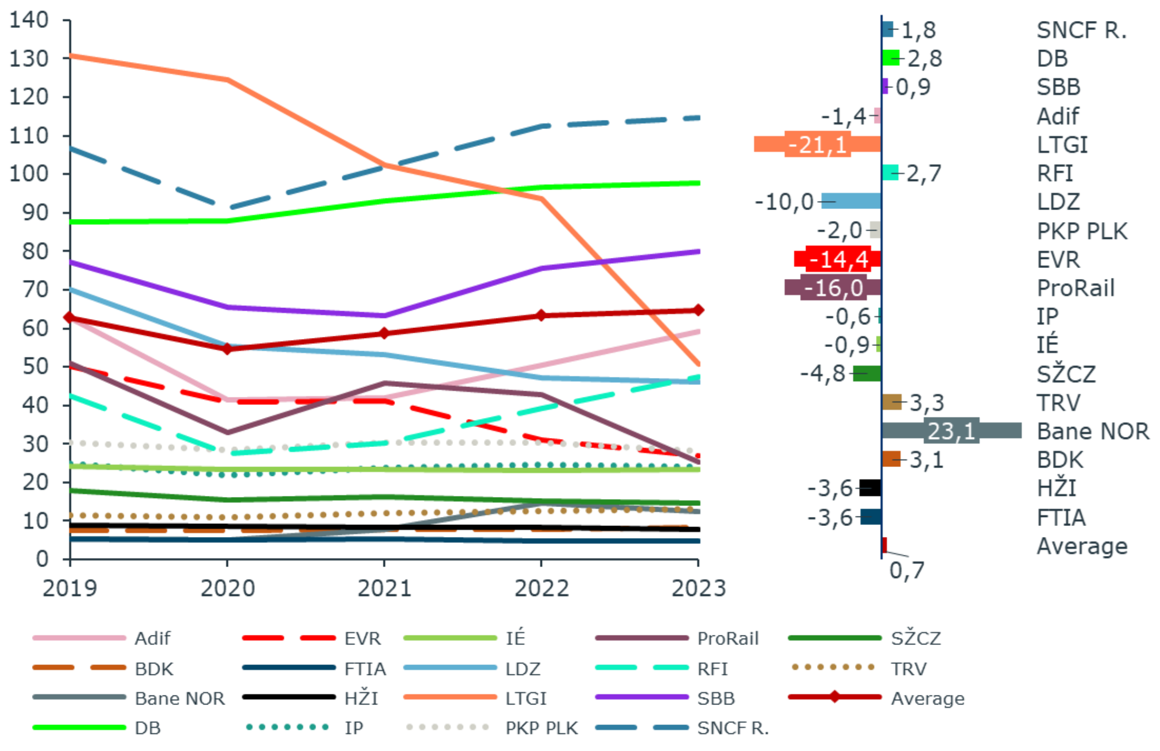

Figure 39: TAC revenue in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

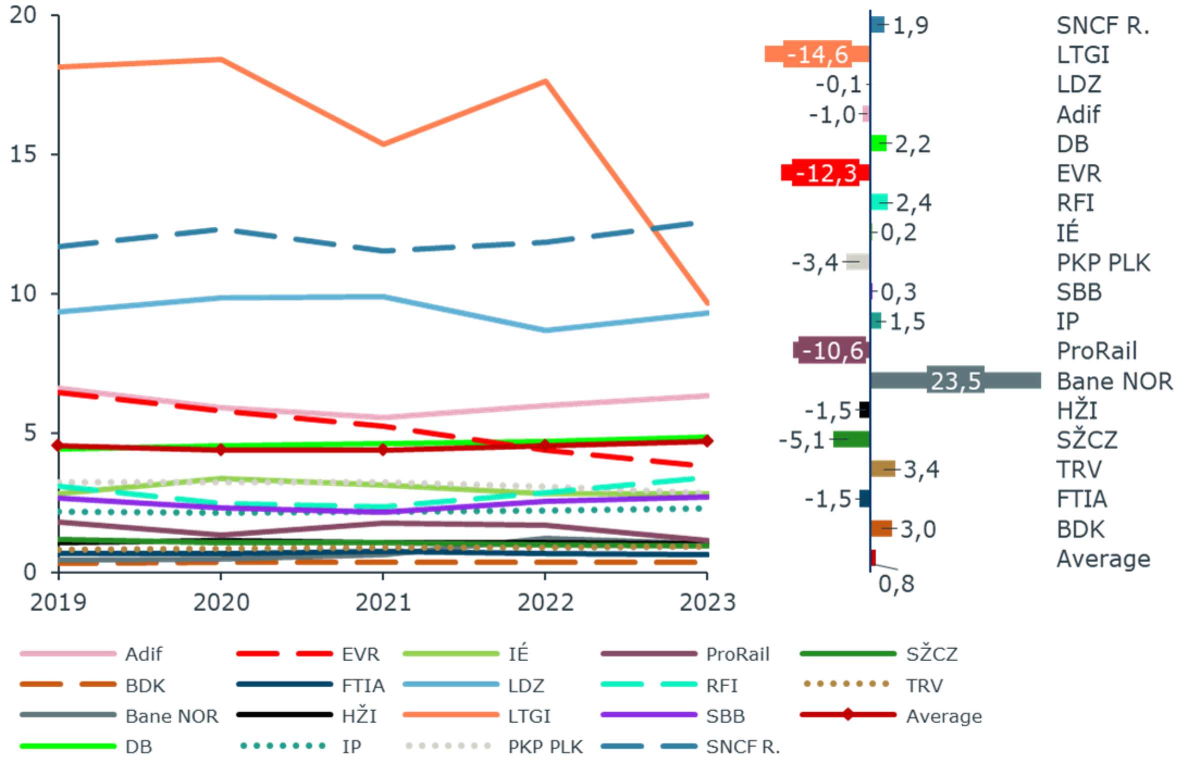

Figure 40: TAC revenue in relation to traffic volume (EUR per total train-km) and CAGR (%) in 2019-2023

Figure 39 and Figure 40 illustrate the development of revenues per track-kilometre and train-kilometre generated by infrastructure managers to cover the cost of the network. By showing the impacts of the Covid-19 pandemic, it indicates why it is important to relate TAC revenues not only to the network but also to train activity. While TAC revenues in relation to network size decreased significantly for most of the infrastructure managers from 2019 to 2020, TAC revenues in relation to traffic volume remained on a similar level as train activity also decreased during the pandemic. As train activity returned to relatively normal in 2021 and 2022 also the track accesses per track-km reached and exceeded the pre-pandemic level.

Figure 41 and Figure 42 give further detail of the TAC revenue in relation to traffic volume by dividing the TAC revenues into passenger and freight revenues. These Figures show that the positive development of TAC revenues is due to higher passenger revenues as freight TAC revenues declined by 2%, with IE and ProRail experiencing the highest decline in revenue in 2023. Nevertheless, there are some positive developments such as increases in TAC freight revenues for EVR in 2023, but still remaining below pre pandemic levels. Only SNCF R., TRV, Adif, RFI and IP experience substantial overall positive growth rates for 2019-2023 of approximately 3 to 4%. Passenger related TAC revenues saw a slight increase to pre pandemic levels with a CAGR of 1.2%. While this positive trend is resembled by most infrastructure managers, the main exceptions is ProRail reporting substantial reduction of passenger TAC of almost 15%.

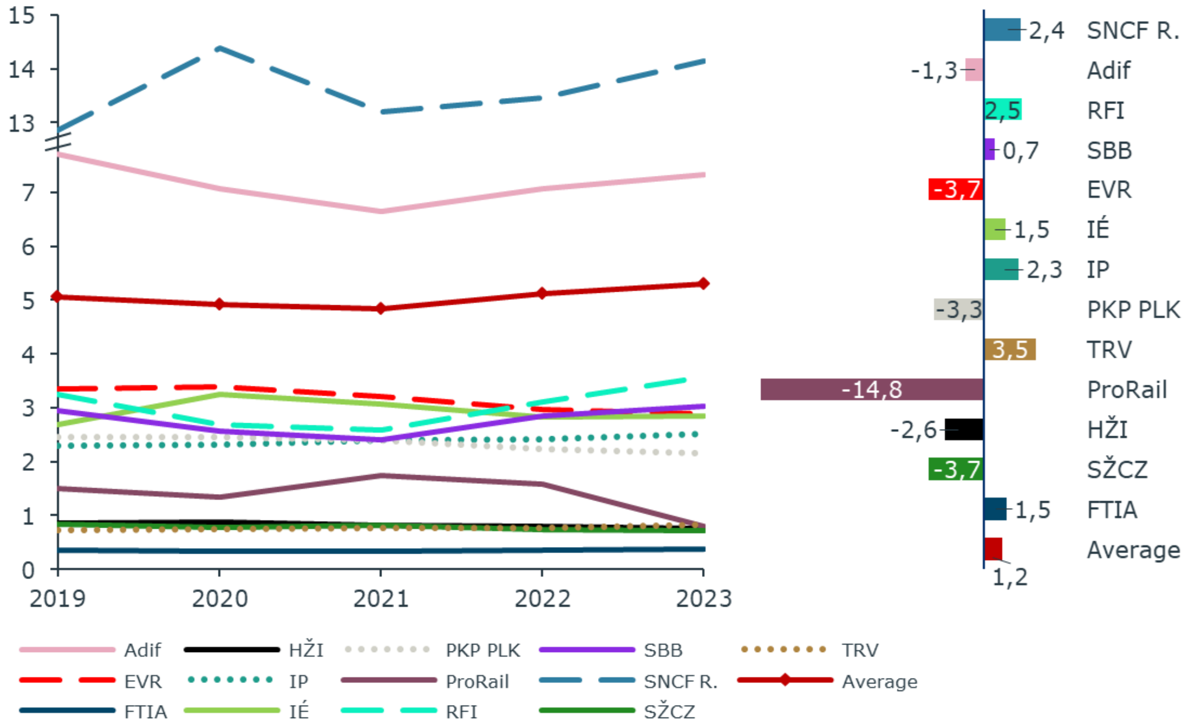

Figure 41: TAC revenue in relation to traffic volume – Passenger (EUR per passenger train-km) and CAGR (%) in 2019-2023

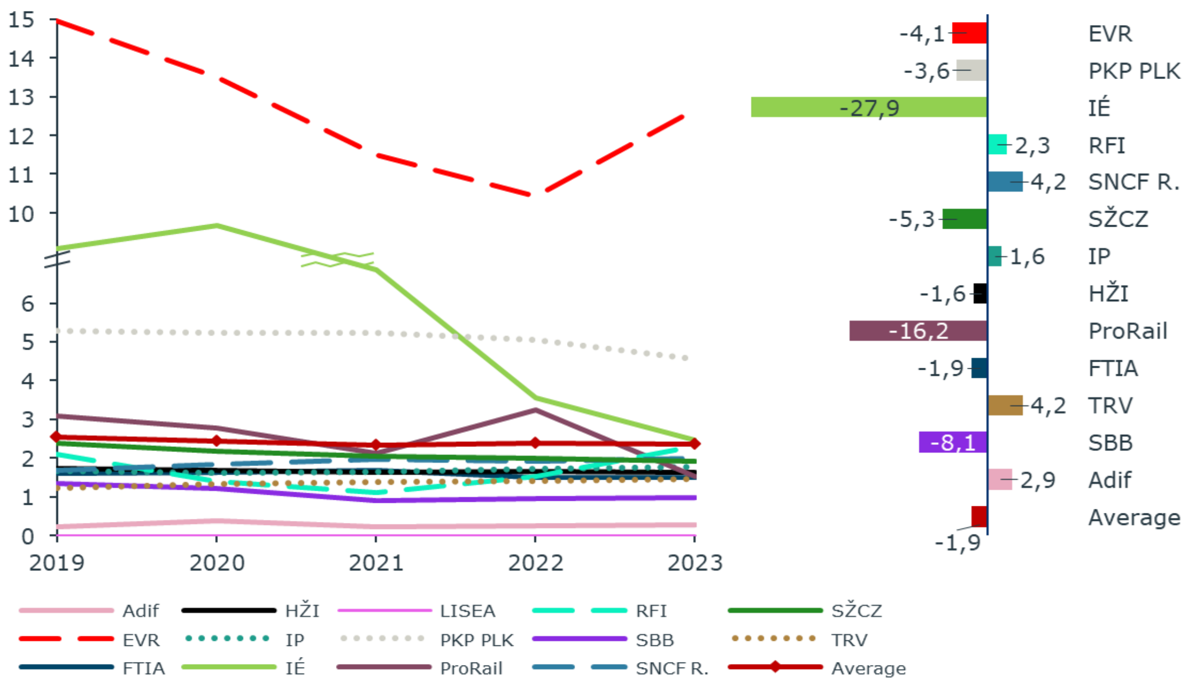

Figure 42: TAC revenue in relation to traffic volume – Freight (EUR per freight train-km) and CAGR (%) in 2019-2023

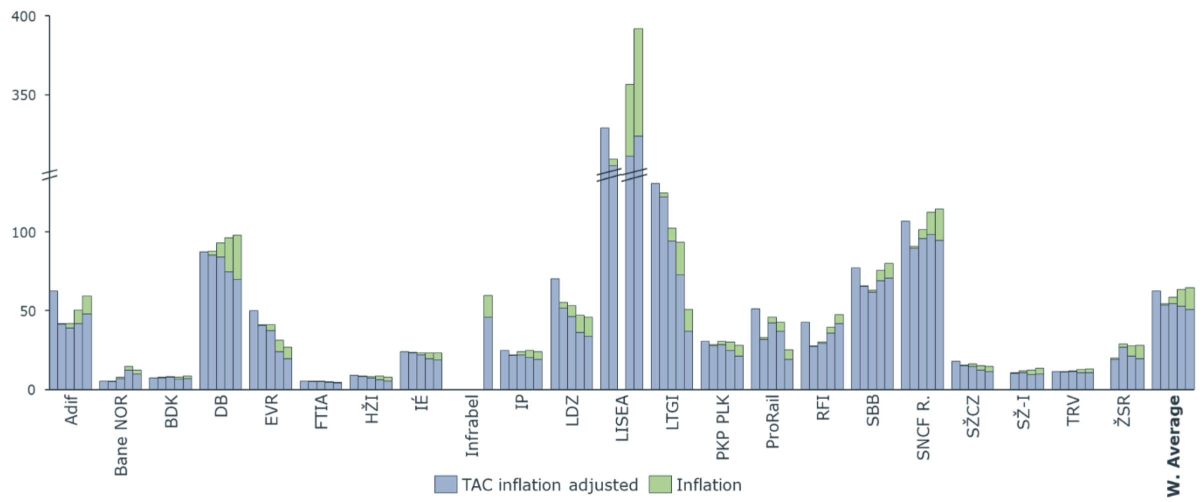

Figure 43: Inflation adjusted TAC revenue in relation to network size (EUR 1 000 per main track-km) in 2019-2023

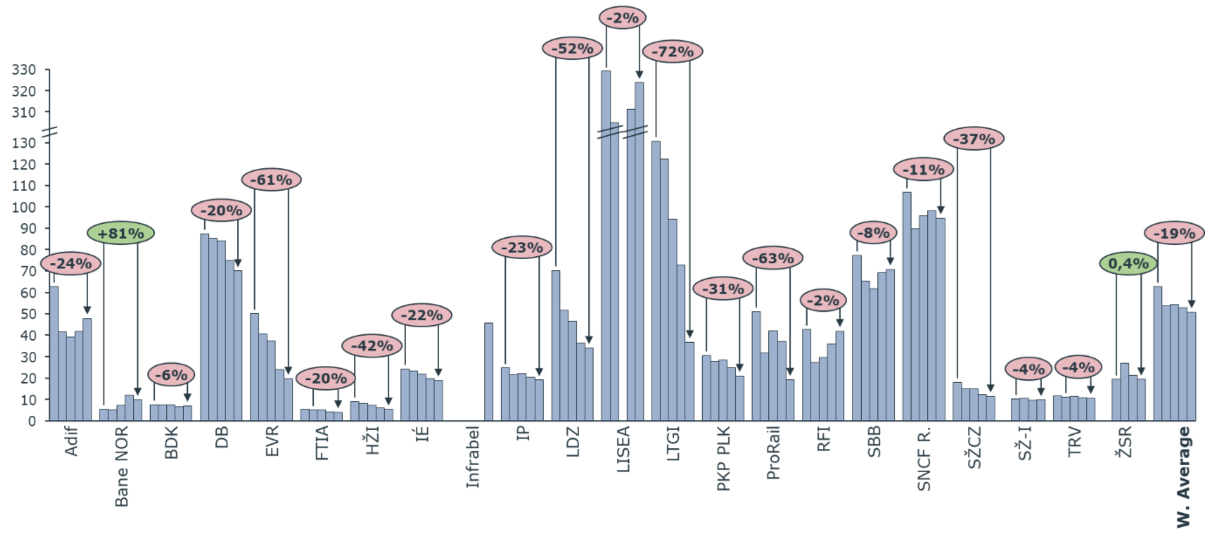

Figure 44: Inflation adjusted TAC revenue in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis presents once again a contrasting picture compared to the analysis of the nominal values of track access charges. Average TAC revenue in relation to network size within the peer group increased slightly by 3% from 2019 to 2023. When adjusted for inflation to 2019 price levels, 2023 showed 19% lower revenues from track access charges than 2019 (Figure 44). As the increase in TAC revenue did not outpace inflation, the TAC revenue of infrastructure managers has decreased significantly in real terms. Only two IMs, Bane NOR and ŽSR, have recorded an increase in real terms. LTGI, LDZ, and EVR experienced the highest real decreases, with declines exceeding 50%.

Non-access charges

Revenues from non-access charges may include revenues from service facilities and other services for operators, commercial letting, advertising, and telecommunication services, but exclude grants and subsidies.

The annual peer group's average of revenues from non-access charges is EUR 25 400 per main track-kilometre. Adif and SBB have similarly high non-access charges of over EUR 60 000 per main track-kilometre, with SBB's high revenues coming from providing goods and services (e.g. use of IT tools, project management) to other infrastructure managers in Switzerland. For Adif, the main sources of non-access charges are energy supply, rentals, intercompany transfers, works for other companies and services in stations and terminals. Seven infrastructure managers have revenues of less than EUR 10 000 per main track kilometre, among which ProRail has zero non-access charges revenues.

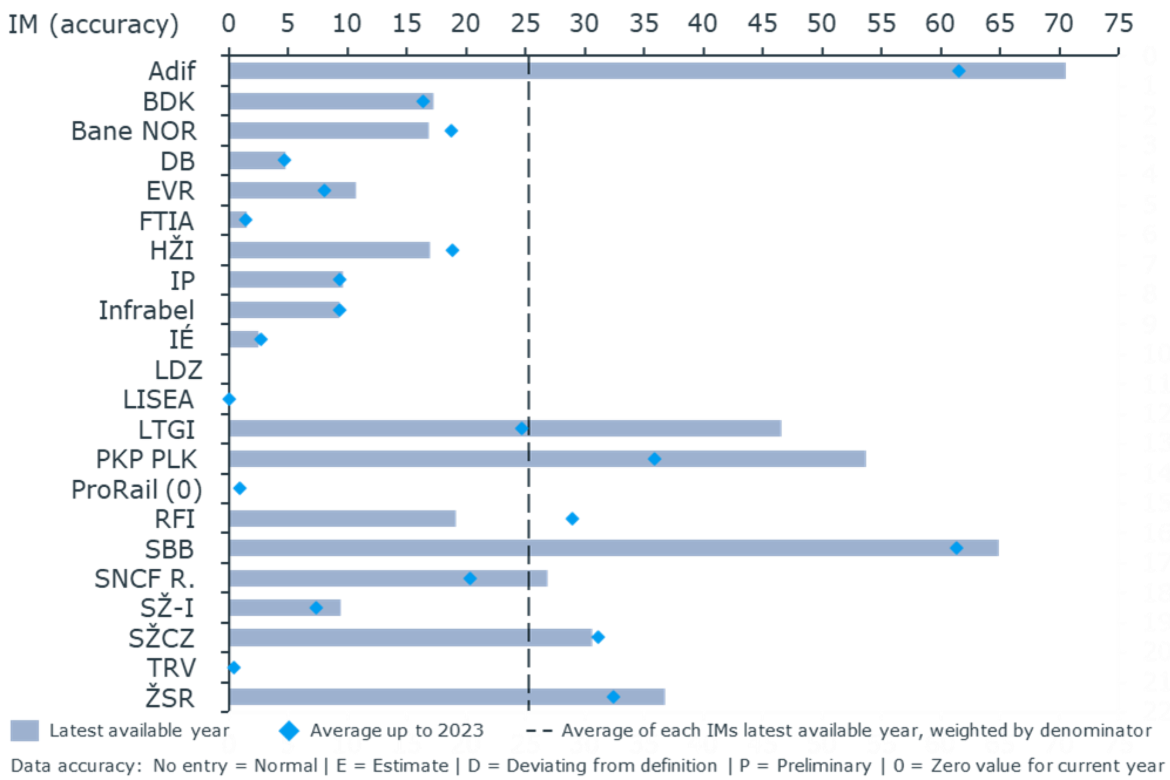

Figure 45: Total revenues from non-access charges in relation to network size (EUR 1 000 per main track-km)

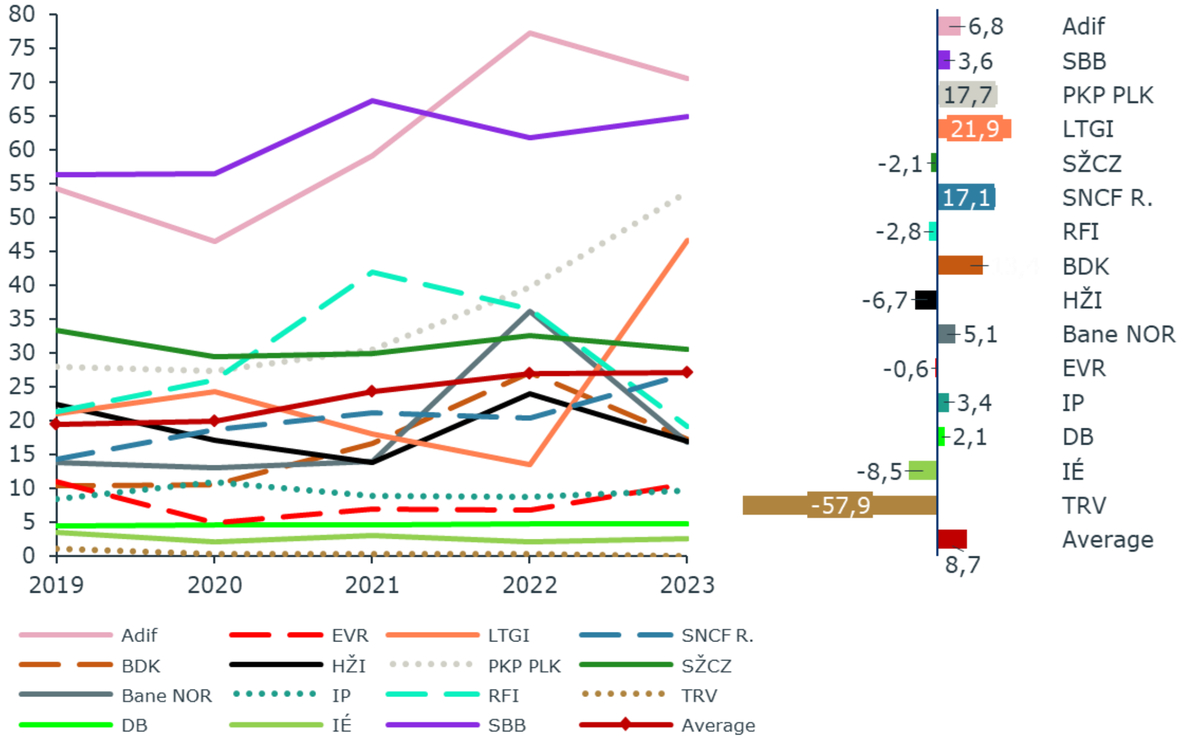

Figure 46: Total revenues from non-access charges in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

The growing importance of third-party financing in the transportation sector is also reflected by the development of the PRIME members. In the period of 2019 and 2023 the majority of infrastructure managers increased their revenues from non-access charges, with an average CAGR of 8.7%. Four companies have reached an annual growth of over 10%. The increase of RFI's value in 2020 and 2021 can be explained by the amount of public resources provided to compensate for the reduction of TAC due to the COVID-19 pandemic, as well as the increase in energy prices for traction.

The figures above demonstrate the different levels of revenues generated by infrastructure managers based on track access-related and non-track access-related sources. One of the main reasons for this variety is the range of possibilities ways of combining public funding, access charging and commercial funding. The precise combination in each country typically reflects historical precedent, the intensity with which the rail network is used, the legacy of asset management (which determines the extent to which maintenance and renewal costs can be forecast with confidence), the need for new capacity (which can prompt a search for alternative forms of funding) and the willingness of users to pay.

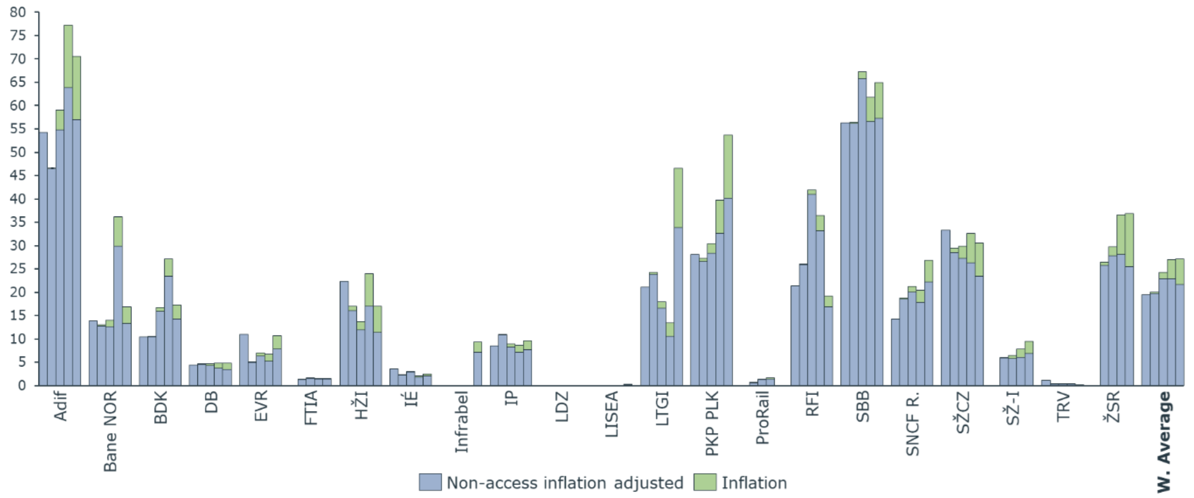

Figure 47: Inflation adjusted total revenues from non-access charges in relation to network size (EUR 1 000 per main track-km) in 2019-2023

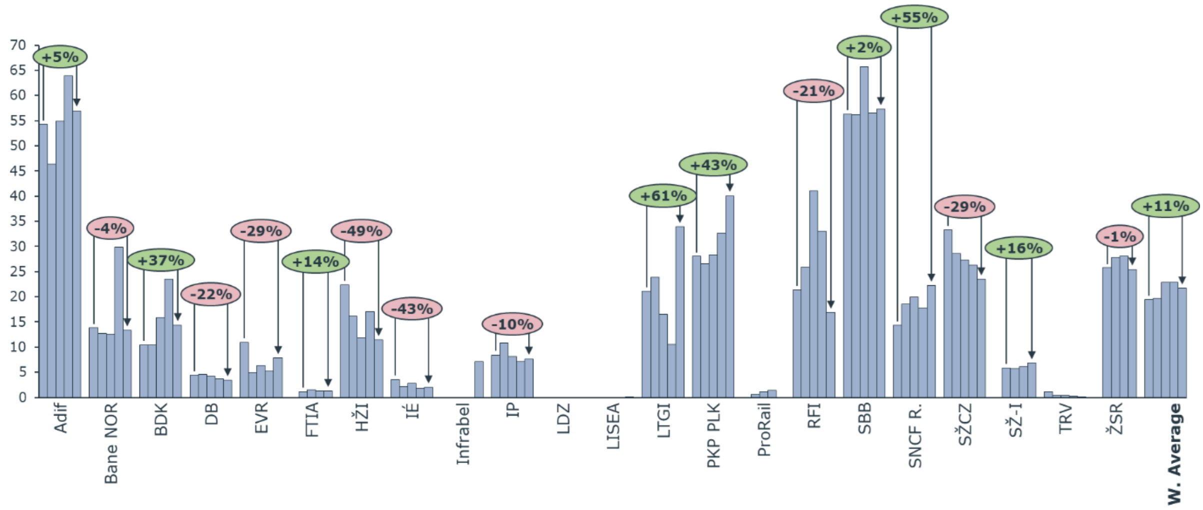

Figure 48: Inflation adjusted total revenues from non-access charges in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis provides once again a nuanced perspective compared to the non-adjusted analysis. Average of the peer group increased by 40% from 2019 to 2023. However, after adjusting for inflation to 2019 price levels, the 2023 average was only 11% higher than the 2019 average (Figure 48). This suggests that a significant portion of the increase in revenues from non-access charges can be attributed to inflation. Even so, the data clearly shows that these revenues have also experienced on average notable growth in real terms. However, this increase in the weighted average was not reflected in most IMs, with half of them experiencing a real-term decline in total revenues from non-access charges.

Public funding

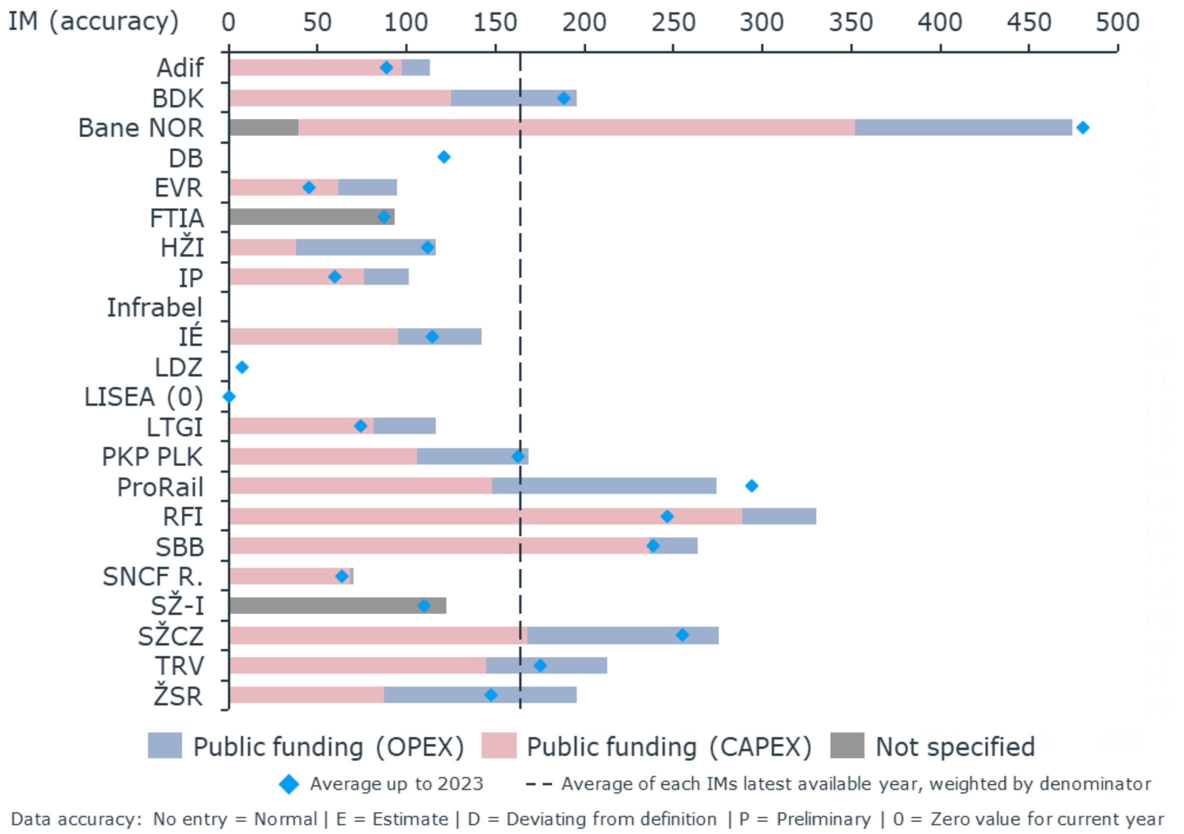

Figure 49: Public funding for OPEX and CAPEX in relation to network size (EUR 1 000 per main track-km)

Figure 49 shows infrastructure managers' public funding dedicated to operational and capital expenditures. On average public funding dedicated to capital expenditures is higher for most organisations with a peer group's average of EUR 129 000, while the operational expenditures' average is EUR 35 000. Bane NOR and ProRail have the highest public funding for OPEX. LISEA has no public funding at all due to its special case.

Figure 50: Public funding in relation to network size (EUR 1 000 per main track-km) and CAGR (%) in 2019-2023

Public funding, in line with other financial indicators, has predominantly seen growth across the board, with all infrastructure managers registering a positive annual growth rate. The average CAGR of public funding for IMs was nearly 10%. The most significant rise in public funding was reported by EVR.

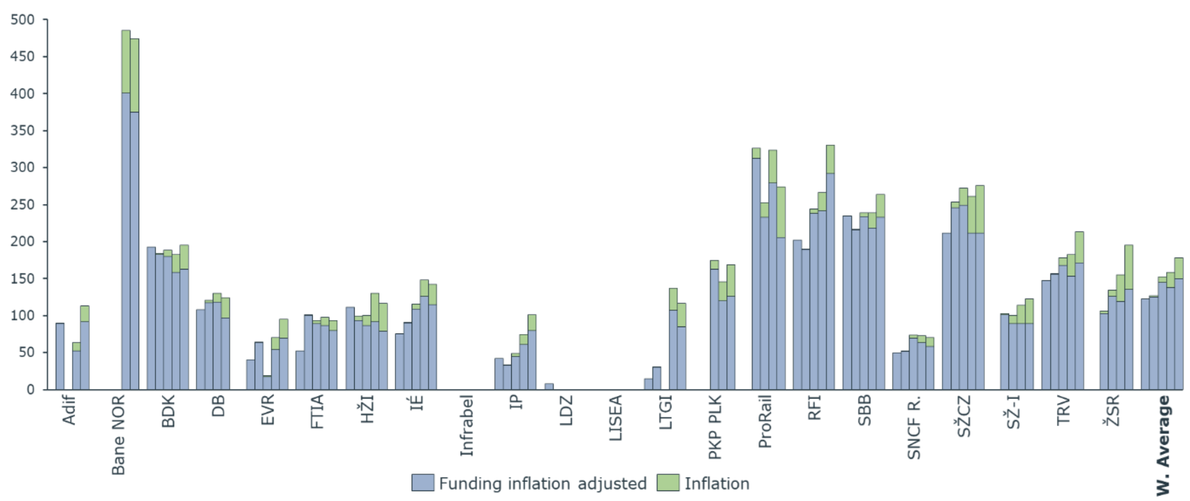

Figure 51: Inflation adjusted public funding in relation to network size (EUR 1 000 per main track-km) in 2019-2023

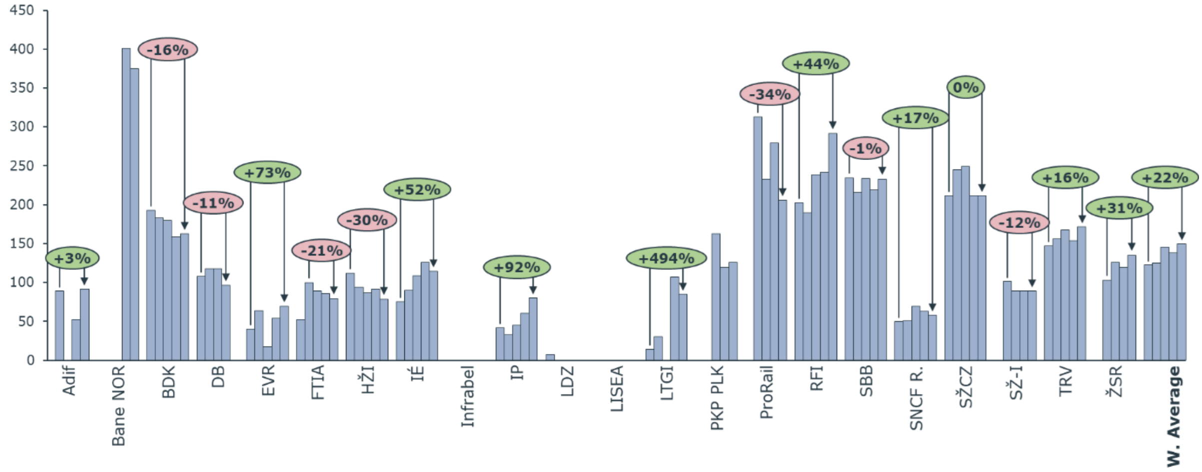

Figure 52: Inflation adjusted public funding in relation to network size in 2019-2023 (EUR 1 000 per main track-km) and percentage change

The inflation adjusted analysis offers a more detailed perspective. Average total funding within the peer group increased by 46% from 2019 to 2023. Inflation adjusted 2023 only showed an increase of 22% compared to 2019 though (Figure 52). Half of the increase in total public funding between 2019 and 2023 had been "eaten up" by inflation, reducing the real term increase of infrastructure managers' funding. This growth is even more significant for the stable financing of IMs, considering that TAC revenues, one of their largest income sources, have declined by 19% in real terms since 2019.

3.3 Safety

3.3.1 Summary of safety

EU-wide objectives

- All infrastructure managers aim at providing safe railway transport.
- To maintain and continuously improve railway safety EU-wide, the European Union has developed a legal framework for a harmonized approach to rail safety.
- The objective of the EU is to maintain and further develop the high standards of rail safety.
- In accordance with the Sustainable and Smart Mobility Strategy, by 2050 the number of fatalities should be close to zero for all modes.

Peer group's performance

- Overall safety performance decreased due to higher number of accidents in 2023.
- Significant accidents increased on average by 4.4%, while fatalities and weighted serious injuries increased by 3.8%.
- Infrastructure managers made progress in their areas of responsibility, with safety incident precursors attributed to them decreasing on average by 3.1%.
- On average there have been 0.4 significant accidents and 0.2 people seriously injured and killed per million train-kilometres each year.

3.3.2 Development and benchmark of safety

For infrastructure managers safety is of outstanding importance and mandatory in any framework of key performance indicators. It is the most important element in the performance of an infrastructure manager, and affects customers, stakeholders, the reputation of the infrastructure manager, the railway and society at large. Infrastructure managers constantly invest in their assets and new technology to provide good safety levels, and they develop their safety policies to achieve maximum awareness. This chapter presents the safety performance of the infrastructure managers.

Rail safety indicators

PRIME members report three indicators measuring railway safety performance:

- Significant accidents
- Fatalities and weighted serious injuries
- Infrastructure manager related precursors to accidents

To increase comparability of these values among infrastructure managers, these values are related to million train-kilometres.

Development and benchmark

Figure 53 to Figure 59 show the safety performance of the PRIME members as a benchmark, and over the time-period 2019-2023.

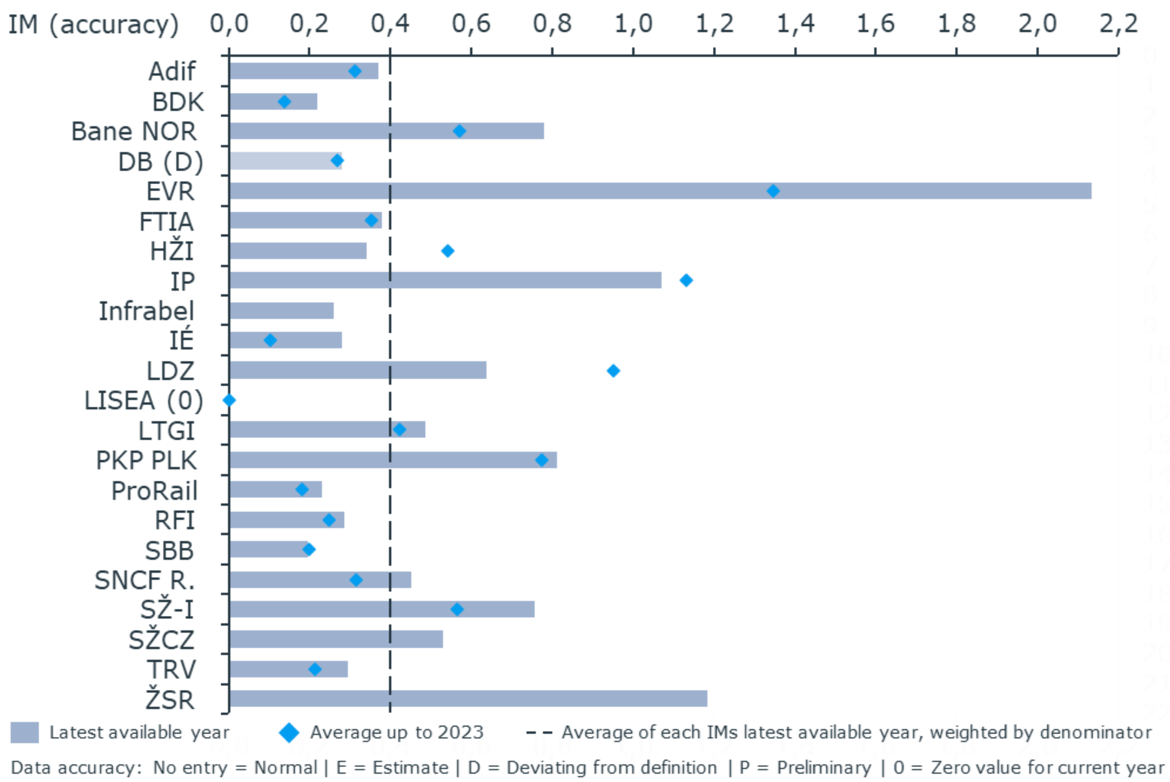

Figure 53: Significant accidents (Number per million train-km)

Figure 53 presents the 2023 data on significant railway accidents. It provides the relative numbers of significant accidents that occurred on the main lines, excluding those in workshops, warehouses, and depots. The graph shows a wide range of values among the infrastructure managers, with LISEA recording zero accidents and EVR reporting 2.1 accidents per million train-kilometers. On average, there were 0.4 significant accidents per million train-kilometers. Twelve infrastructure managers reported accident figures below this average. The lighter grey of DB indicates deviating data, which is explained in the Annex 4.3.

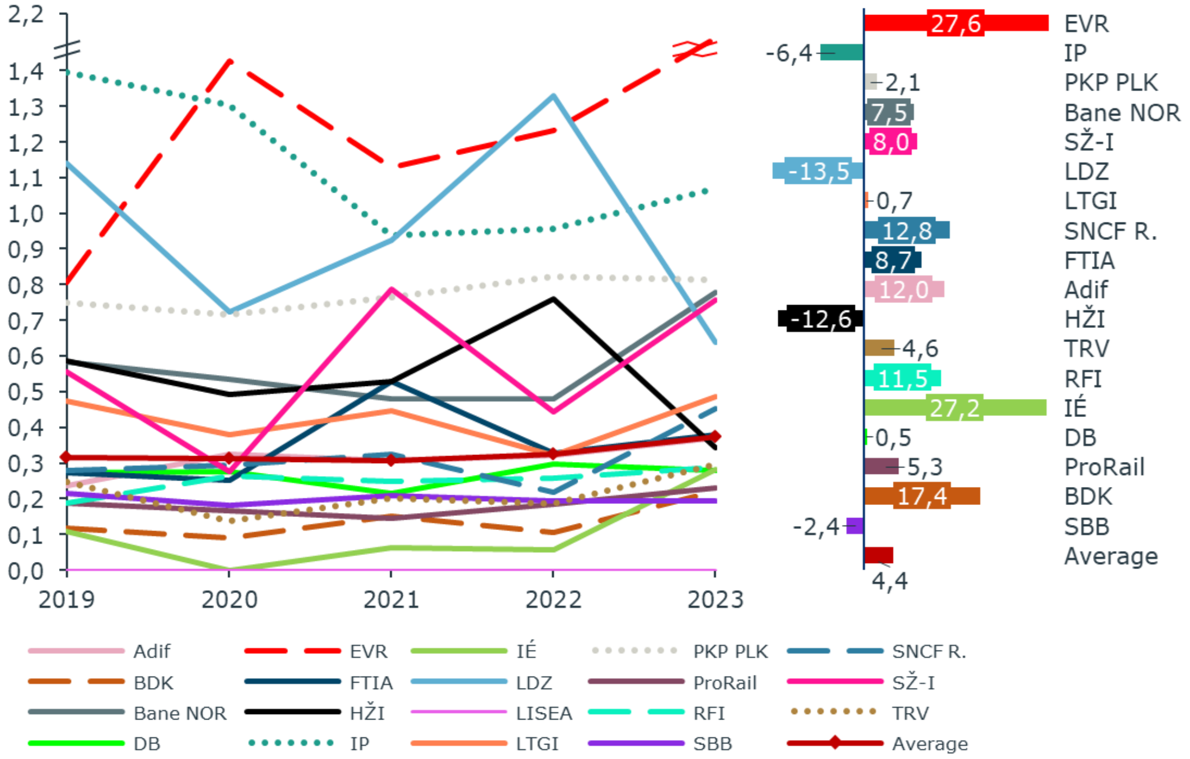

Figure 54: Significant accidents on infrastructure manager's network (Number per million train-km) and CAGR (%) in 2019-2023

Figure 54 displays the development of significant accidents on infrastructure networks and the corresponding compound annual growth rate (CAGR) values from 2019 to 2023. In the observed period, safety levels decreased from 2022 to 2023, as evidenced by an increase in accident numbers. Six infrastructure managers reported a CAGR in accident rates of over 10%.

Notably, IÉ and EVR exhibited a sharp CAGR increase of approximately 27%, reflecting significantly higher accident numbers compared to previous years. While the baseline for Ireland was very low, Estonia already had a high number of reported accidents in recent years. Positive examples include LDZ and HŽI, which reported lower accident numbers. The increase in the average number of accidents as well as the increase of many CAGR values further underlines the importance of monitoring and intensifying the efforts to improve rail safety to maintain high safety standards.

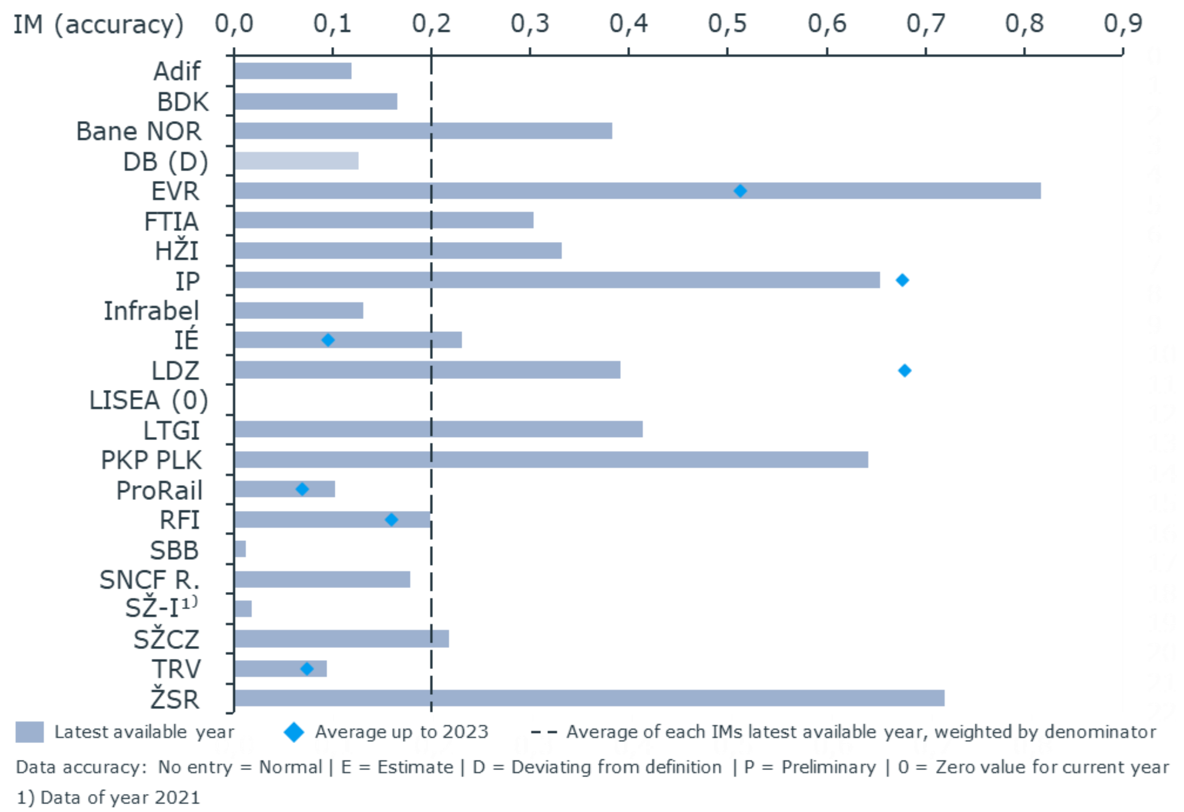

Figure 55: Fatalities and weighted serious injuries (Number per million train-km)

The PRIME indicator for "Fatalities and weighted serious injuries" follows the definition and calculation method of the European Union Railway Agency (ERA) for the indicator of the same name. In this indicator, persons suffering serious injuries are given a statistical weight equal to 0.1 of a fatality. For all infrastructure managers, the average rate of serious injuries or fatalities is 0.2 per million train-kilometres. However, this figure varies considerably across the group, with a standard deviation of 0.23, indicating considerable variation in the data. This is further supported by a comparison of the highest and lowest reported values. IP, PKP PLK, ŽSR, and EVR report values over 0.6, while LISEA, SŽ-I, and SBB have values below 0.05.

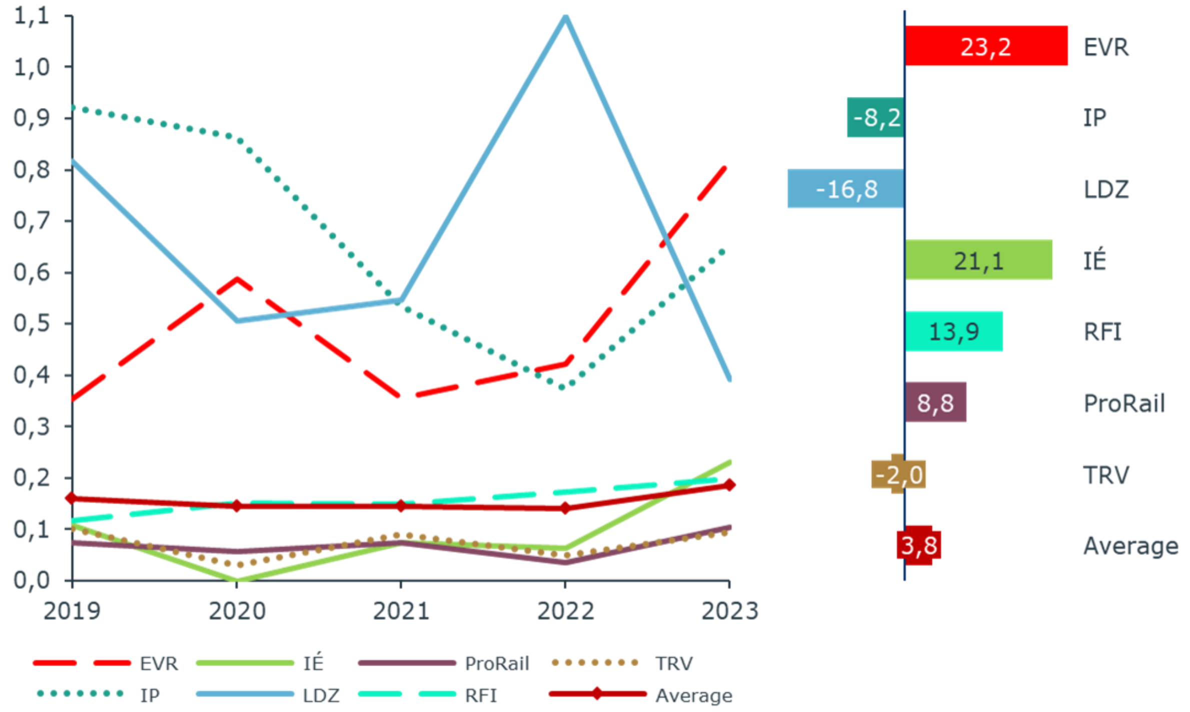

Figure 56: Fatalities and weighted serious injuries (Number per million train-km) and CAGR (%) in 2019-2023

The alignment of the PRIME definition with the ERA definition was done in 2021 and required changes on the data of the infrastructure managers. Due to this, the completeness of historical data is limited and only six infrastructure managers are shown in the time series graph. Nevertheless, the graph remains consistent with other safety indicators such as significant accidents. Therefore Figure 56 paints a similar picture to Figure 54, with EVR and IÉ reporting increases and IP and LDZ reporting a drop in fatalities. The average CAGR increased by 3.8%.

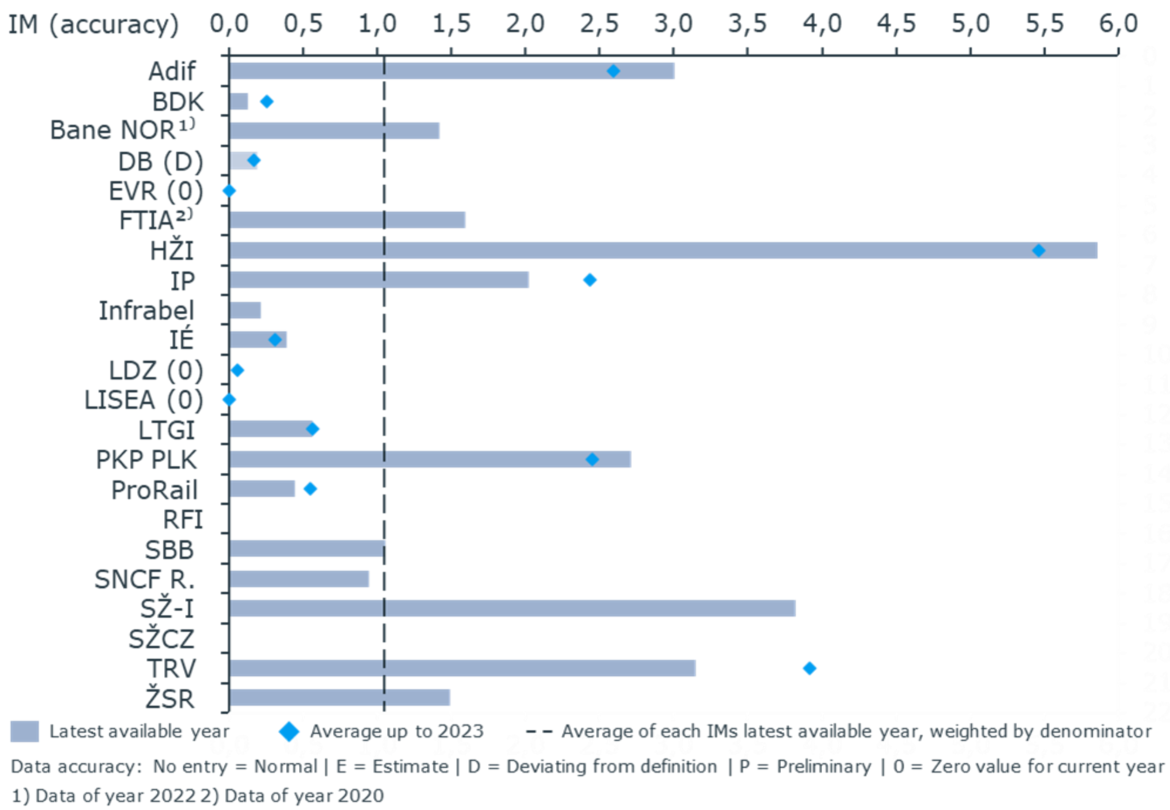

Figure 57: Infrastructure manager related precursors (Number per million train-km)

Precursors are a good indicator to understand and mitigate root causes for significant accidents and include broken rails, track buckle and track misalignment, as well as wrong side signalling failures.

Like the variation seen with other safety indicators, there's a notable disparity across the peer group when it comes to infrastructure manager-related precursors. The average stands at 1.05 precursors per million train-kilometers. In 2023, several organisations such as EVR, LISEA, LDZ and SŽCZ reported zero precursors, whereas the highest numbers were documented by HŽI, TRV, Adif and SŽ-I.

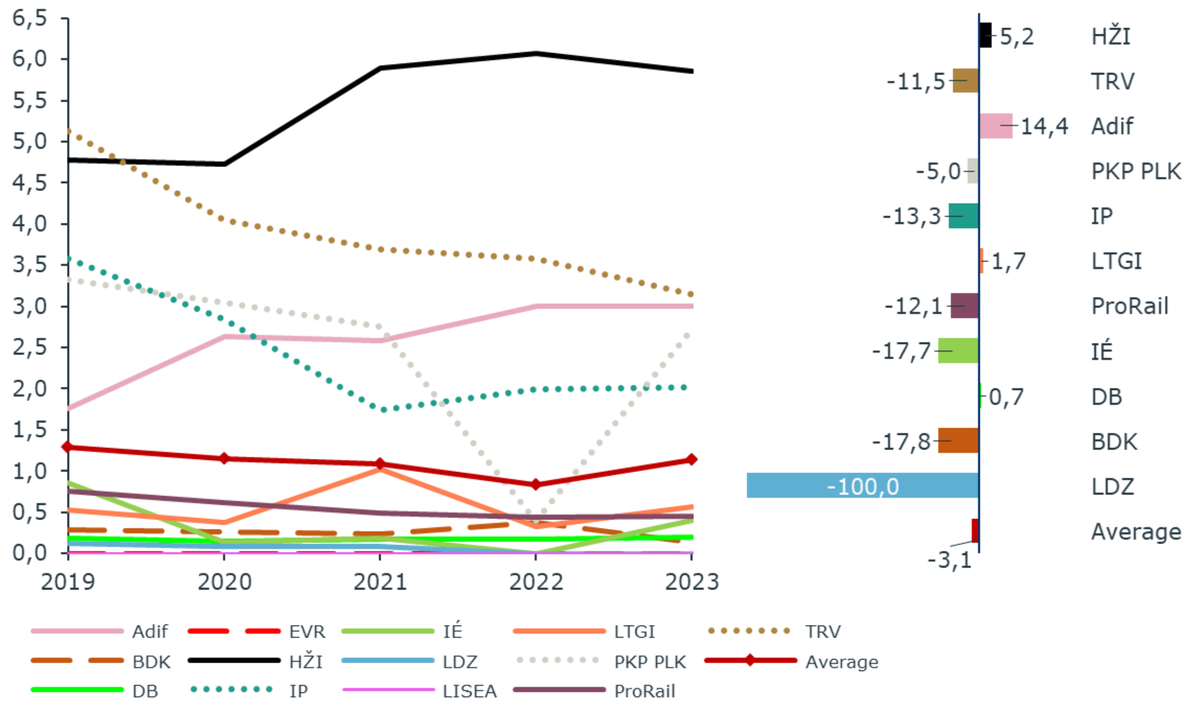

Figure 58: Infrastructure manager related precursors (Number per million train-km) and CAGR (%) in 2019-2023

Although the overall safety performance declines Figure 58 displays a more positive result. Precursors involving infrastructure managers show an average improvement with a CAGR reduction of 3.1%. Notably, LDZ reports significant reductions due to zero precursors in 2023. Furthermore, ProRail, BDK, and IÉ showed double-digit CAGR improvements despite starting with low baselines. However, increases are reported by Adif and HZI.

Rail safety is influenced by a wide array of factors. Safety policies should be preventive and reactive at the same time. Providing assets in good condition by ensuring appropriate activity levels of maintenance and renewal is a precondition for reliable and safe operations. Safety figures are also influenced by unauthorised persons entering the rails, whereby these incidents can only be influenced by the infrastructure manager to a limited extent. Many infrastructure managers have launched campaigns to reduce the number of level crossings and to introduce modern signalling and communication systems. Increased awareness among employees and track workers, as well as the public, is another main pillar of rail safety. An organisation’s safety culture is therefore essential, playing a major role by employing direct preventive measures, and through raising awareness of safety, which reduces the influence of the human factor. Regarding casualties, response time in emergency services and different reporting and hospital procedures in the Participating states might also have an impact on the statistics.

As infrastructure managers in the EU are working under different circumstances it is very important to put the data in context. The infrastructure managers from newer EU countries in Eastern Europe are still in a phase of modernising and upgrading their railway networks. The initial conditions were different not only regarding asset conditions and technical safety equipment, but also safety policies. In addition, it is important to note that to identify infrastructure manager related precursors to accidents, an organisation must have sufficient capacity and implemented systems to capture them.

3.4 Environment

3.4.1 Summary of environment

EU-wide objectives

- The European Green Deal aims to make Europe climate-neutral by 2050.
- In accordance with the EU's Sustainable and Smart Mobility Strategy:
  - All transport modes need to become more sustainable.
  - Sustainable transport alternatives should be widely available.
  - Scheduled collective travel of under 500 km should be carbon-neutral by 2030 within the EU.
- Rail needs to continue with further electrification of the track or using greener alternatives to diesel where electrification is not possible. The TEN-T core network is to be electrified by 2030, the comprehensive network by 2050.

Peer group's performance

- The network of the peer group is mostly electrified with an average of 71.5%.
- The share of electricity-powered trains in relation to train-kilometres across the peer groups is around 82%.
- Network electrification shows a modestly positive trend from 2019 to 2023.
- The proportion of electricity-powered trains saw an average increase of 1%, largely due to the expansion of electrified train services in countries with relatively low levels of electrification previously.
- While the degree of electrification strongly correlates with the share of electricity-powered trains, the electrified networks are not 100% exploited.
- The peer group obtains approximately 51% of its energy from renewable sources.

3.4.2 Development and benchmark of environment

While rail is the most environmentally friendly transport mode it is still important that it continues to become greener. The biggest overall impact will come from electrification and the use of greener alternatives to diesel where electrification is not possible. Another possibility is to increase the share of renewable energies in traction energy, for which data is available since this year. The indicators related to the electrification process and energy consumption are presented in this chapter.

Rail environment indicators

PRIME members are reporting five indicators measuring railway environmental performance:

- Degree of electrification
- Share of electricity-powered trains
- Share of diesel-powered trains
- Share of renewable traction energy
- Share of renewable energies (excl. traction)
- CO_2 emission produced from maintenance rolling stock

To increase comparability of these values among infrastructure managers, these values are related to main track-kilometres and to train-kilometres.

Development and benchmark

Figures from Figure 59 to Figure 68 show the relevant environmental indicators as a latest benchmark between the infrastructure managers and their development over the time period 2019-2023.

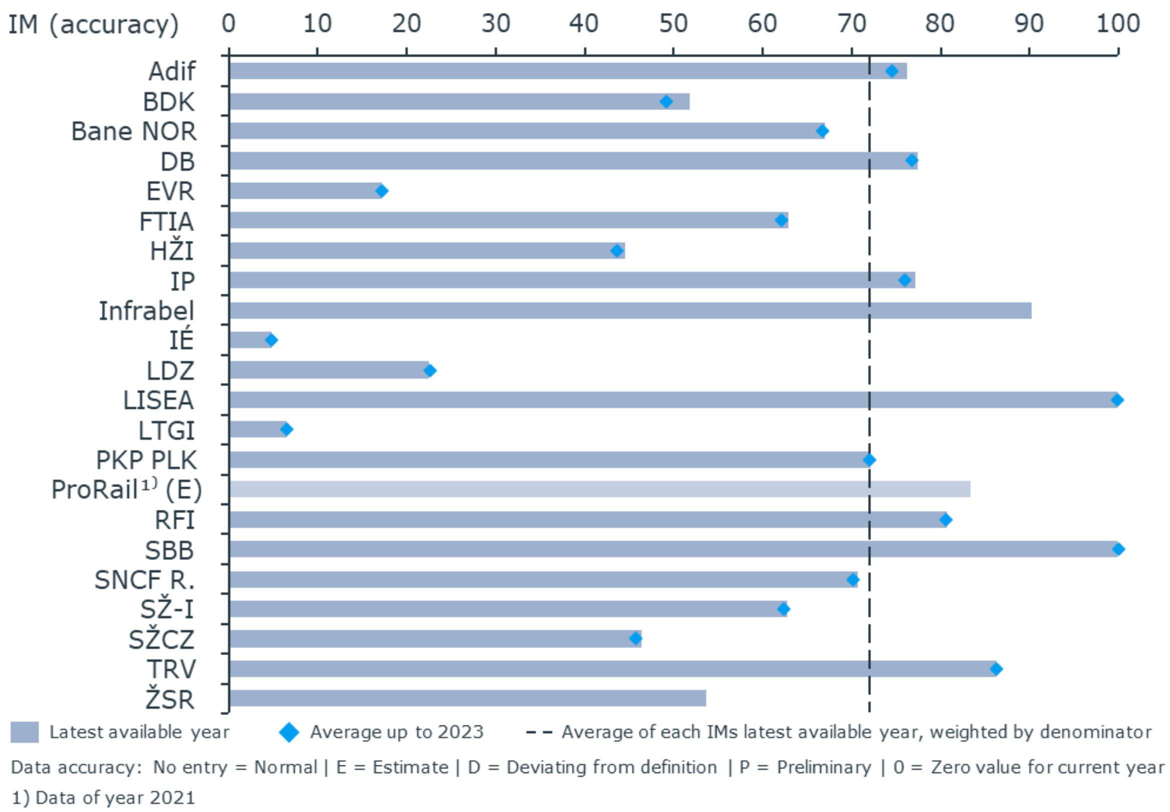

Figure 59: Degree of electrification of total main track (% of main track-km)

In the EU railway networks are mostly electrified. The peer group's average is 71.5%, however, the degree of electrification varies widely from 6% to 100%. While SBB and LISEA have electrified their entire network, IÉ and LTGI have an electrification degree of below 10%.

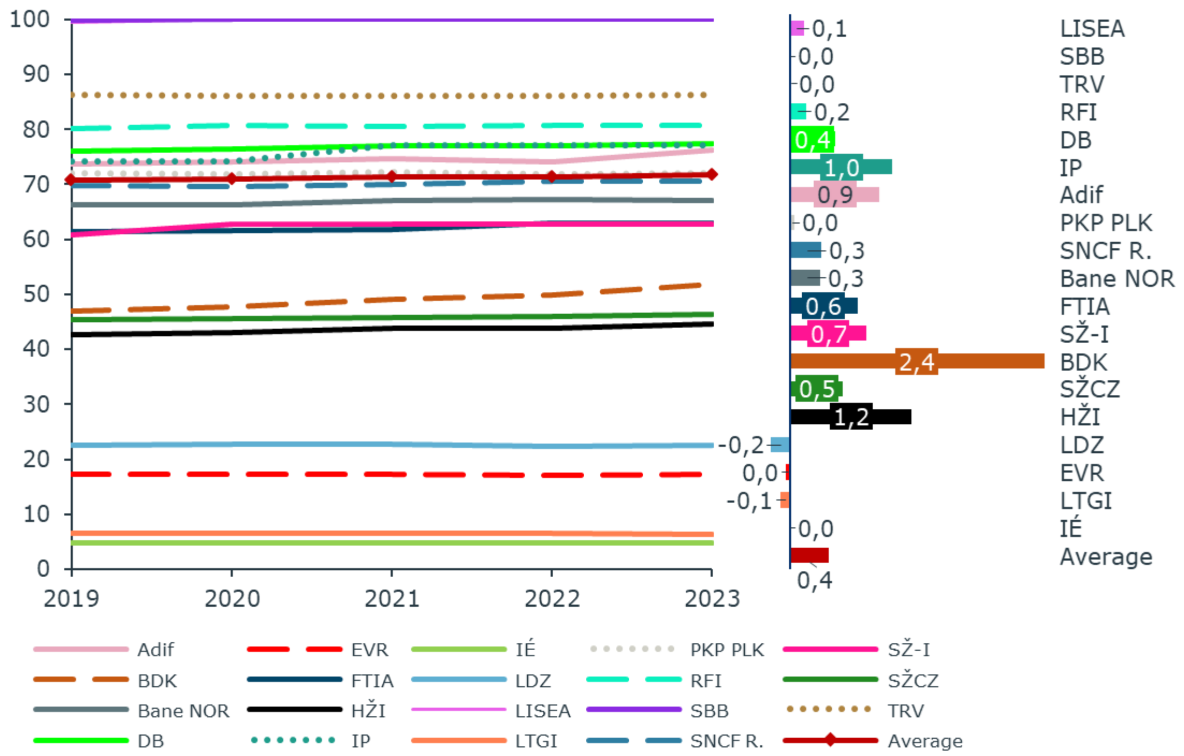

Figure 60: Degree of electrification of total main track (% of main track-km) and CAGR (%) in 2019-2023

Between 2019 and 2023, the level of electrification of main tracks showed relative stability. BDK stands out for having the most significant growth, expanding its electrified main tracks from 47% in 2019 to 52% in 2023. On average, there was a modest yearly increase of 0.4% in the electrification rate among the peer group.

Network utilisation and density appear to be a driver for electrification in several cases. As the transfer to electrified lines requires high investments, electrification makes economically most sense on busy lines. On low-density lines the cost-efficiency is not proven, which is one reason why some infrastructure managers, such as IÉ, LDZ and LTGI, are showing rather low degrees of electrification. Economic conditions can also impact the ability of a rail member to invest. Infrastructure managers and operators managing and running on low-density networks are discussing other approaches to develop greener railways. Battery powered trains and hybrid-diesel electric locomotives are two possible approaches. Making rail transport more sustainable cannot only be achieved by a fully electrified network, but also by incentivising and investing in other alternative energy sources.

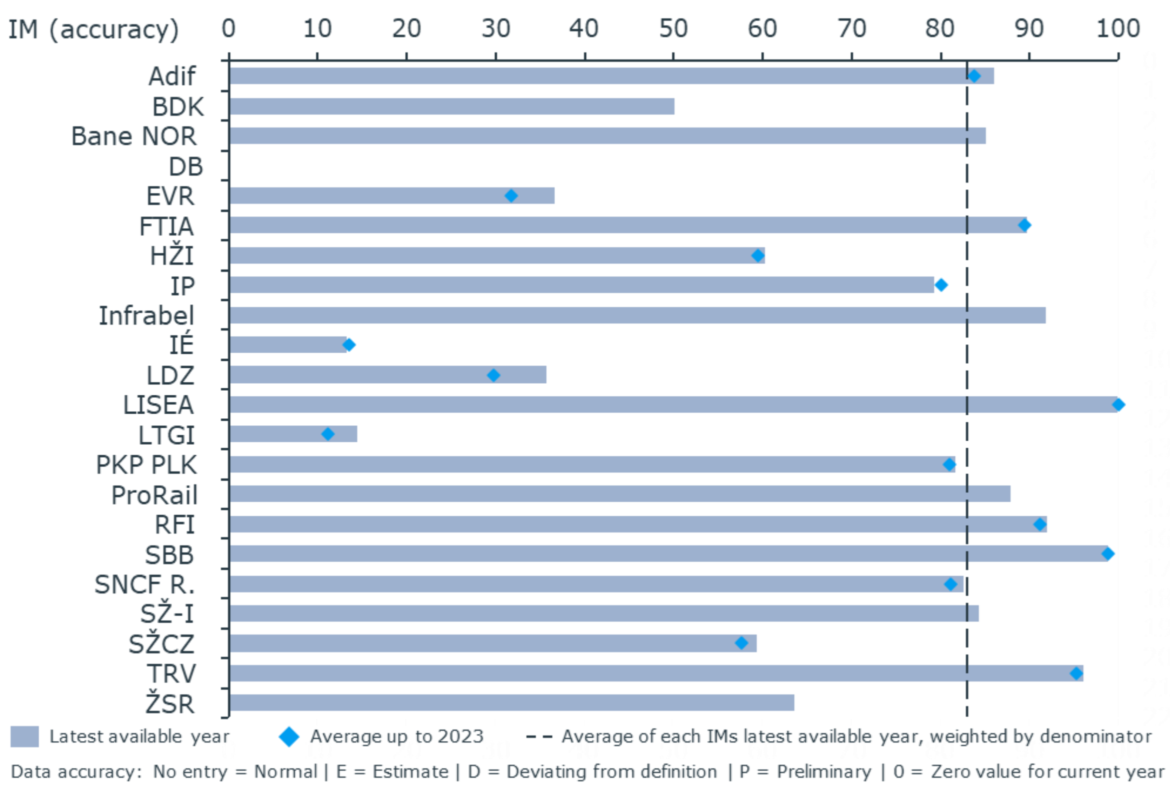

Figure 61: Share of electricity-powered trains (% of total train-km)

The share of electricity-powered trains corresponds to the electrification of the network. Over 82% of the peer group's traffic is powered by electricity. On LISEA's network all trains run with electricity-power. SBB, TRV, RFI and Infrabel have above 90% of electricity-powered trains running on their network. The lowest share of electricity-powered trains can be seen for IÉ and LTGI, which is not surprising considering the degree of electrification of their network.

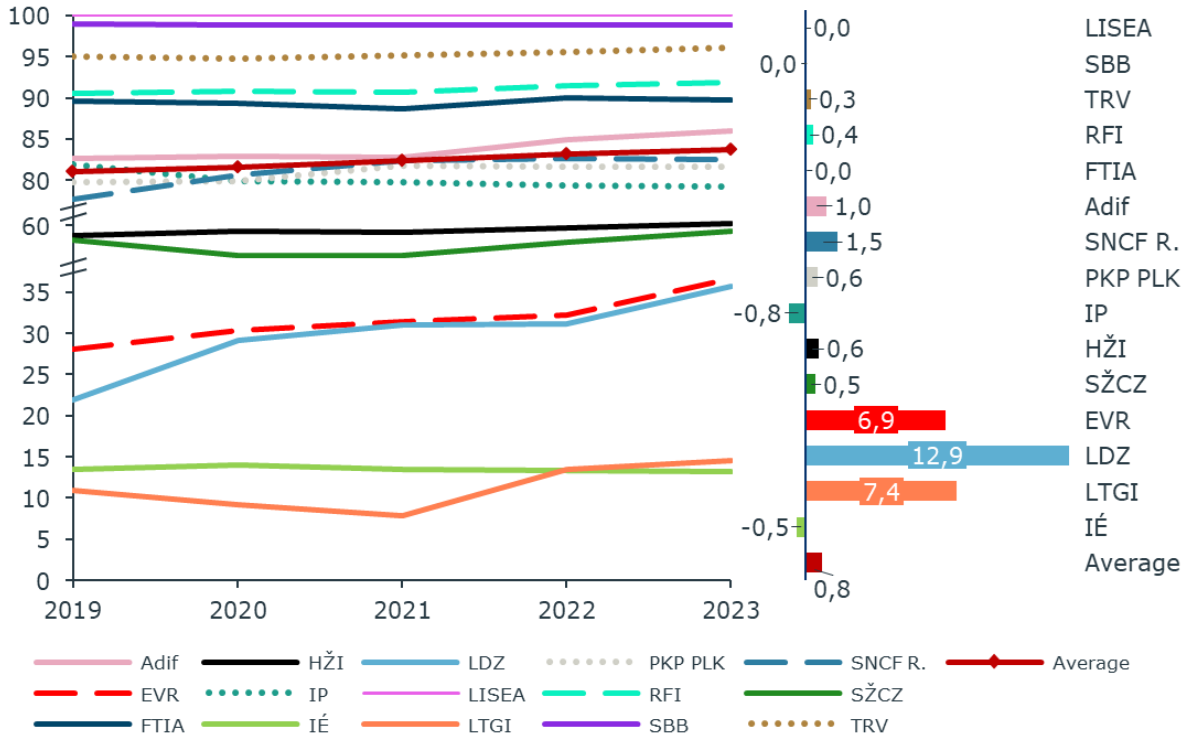

Figure 62: Share of electricity-powered trains (% of total train-km) and CAGR (%) in 2019-2023

Figure 62 illustrates the trend in the share of electricity-powered train from 2019 to 2023. Mirroring the stable yet slightly upward trend in main track electrification, there has been especially a noticeable increase among infrastructure managers with a previously low share of electricity-powered trains, particularly for LDZ, LTGI and EVR. LDZ recorded the most substantial annual growth, improving its percentage of electricity-powered trains from 21% in 2019 to 37% in 2023. LTGI raised their shares from approximately 11% to 15%, while EVR experienced an annual growth rate of almost 7%, translating to an increase in electricity-powered trains from 28% to 37%.

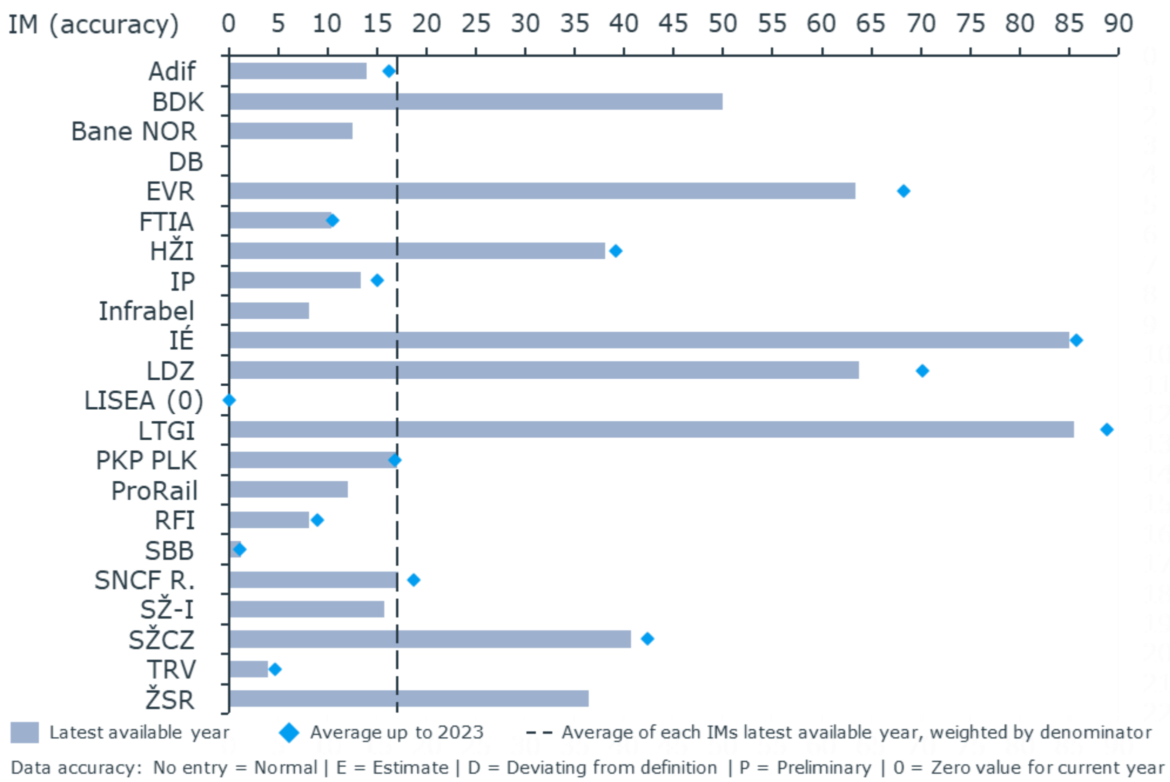

Figure 63: Share of diesel-powered trains (% of total train-km)

Figure 63 is the counterpart to Figure 61 and shows the share of diesel-powered trains in relation to total traffic volume of the infrastructure managers. Corresponding to the low electrification level of their network, the Baltic countries and Ireland show higher rates of diesel-powered trains than the rest of the group. 85% of LTGI's, 86% of IÉ's, 63% of LDZ's and 63% of EVR's traffic volume is produced by diesel-powered trains while the peer group's average stays around 17%.

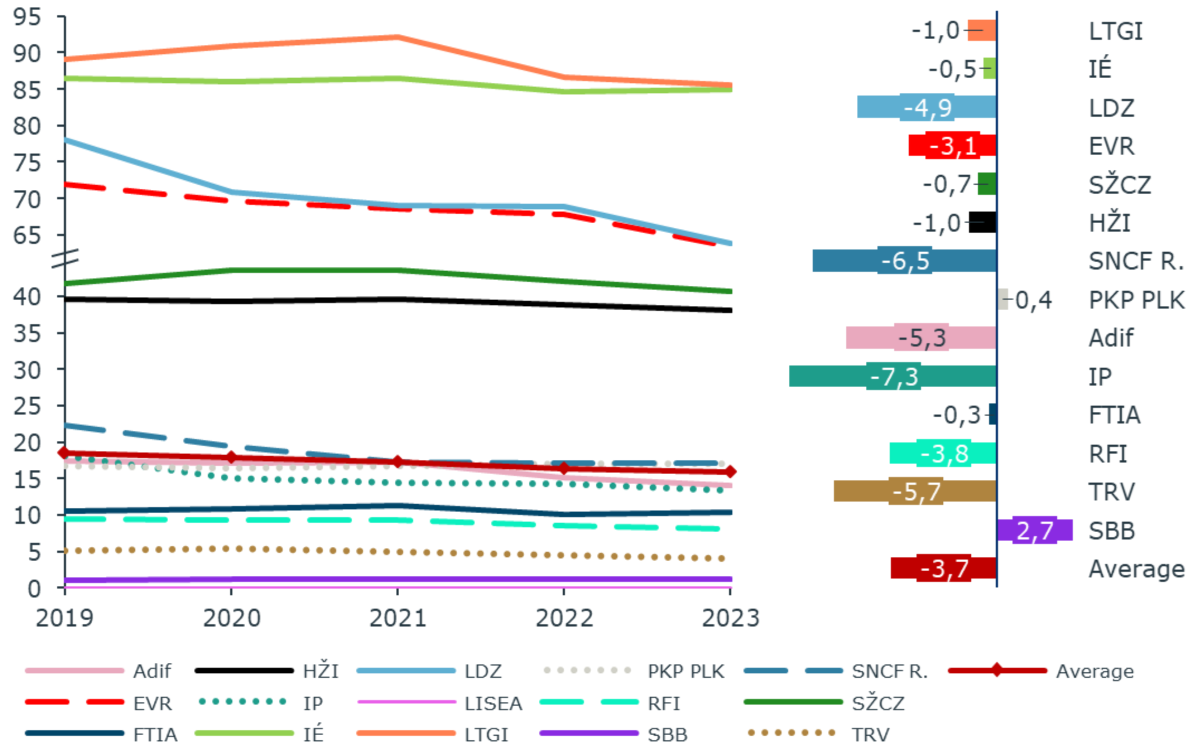

Figure 64: Share of diesel-powered trains (% of total train-km) and CAGR (%) in 2019-2023

Figure 64 shows the development of the share of diesel-powered trains between 2019 and 2023. Considering the European Commission's objective of reducing the share of diesel-powered trains, the declining trend (-3.7%) across the peer group is promising. Almost all infrastructure managers decreased their share of diesel-powered trains, five companies by over 5% and 2 companies over 3%. The highest decrease can be seen at IP, which shows an annual reduction of 7.3%. The highest annual growth can be seen at SBB, as there has been a moderate increase in diesel powered freight and work trains.

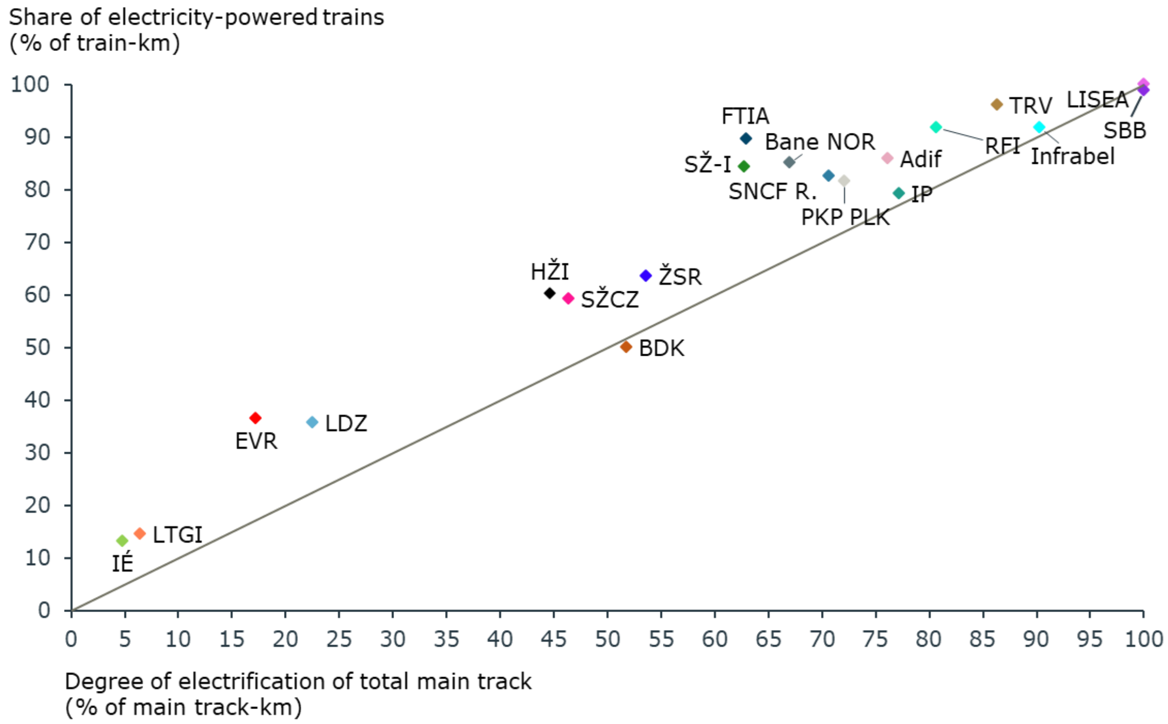

Figure 65: Share of electricity-powered trains (% of train-km) / Degree of electrification (% of main track-km)

Figure 65 shows an unsurprising correlation between the degree of electrification of the network and the share of electric trains. However, it is noticeable that similar degrees of electrification do not automatically lead to similar shares of electrically produced train services. The decision to operate electricity-powered trains lies mainly with the operator, which may decide to run diesel-powered trains or alternative engines on electrified lines. Historic trains or trains that also run on non-electrified lines are two examples.

BDK anticipates an increase in the share of electricity-powered trains in the coming years, as RUs in Denmark have acquired electric train sets scheduled for rollout until 2027.

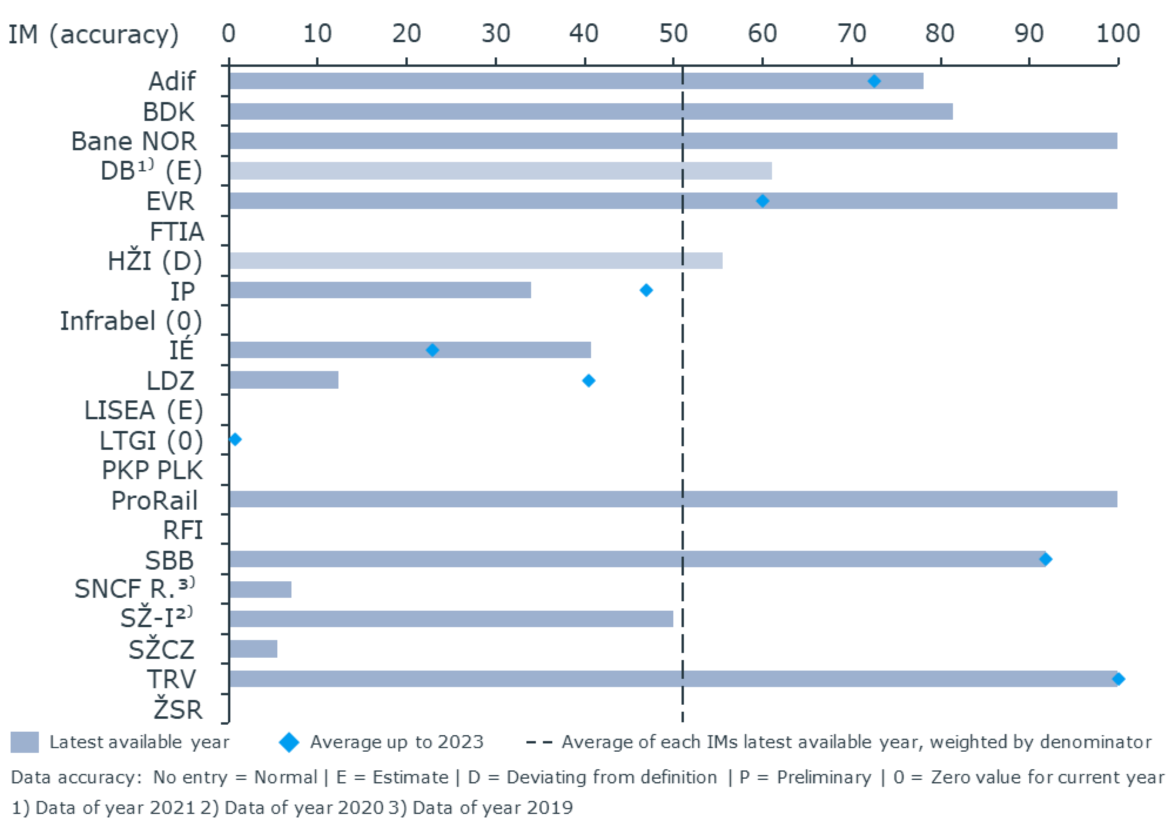

Figure 66: Share of renewable traction energy (% of kWh)

Rails also aim to become greener in terms of energy consumption. Figure 66 shows the proportion of renewable traction energy in relation total traction energy in kWh. As we can see Bane NOR, EVR, TRV and ProRail obtain 100% of the energy needed to run electric trains from renewable energy sources, SBB has a share of over 90% mainly produced by its own hydropower plants. The peer group's average is 51%.

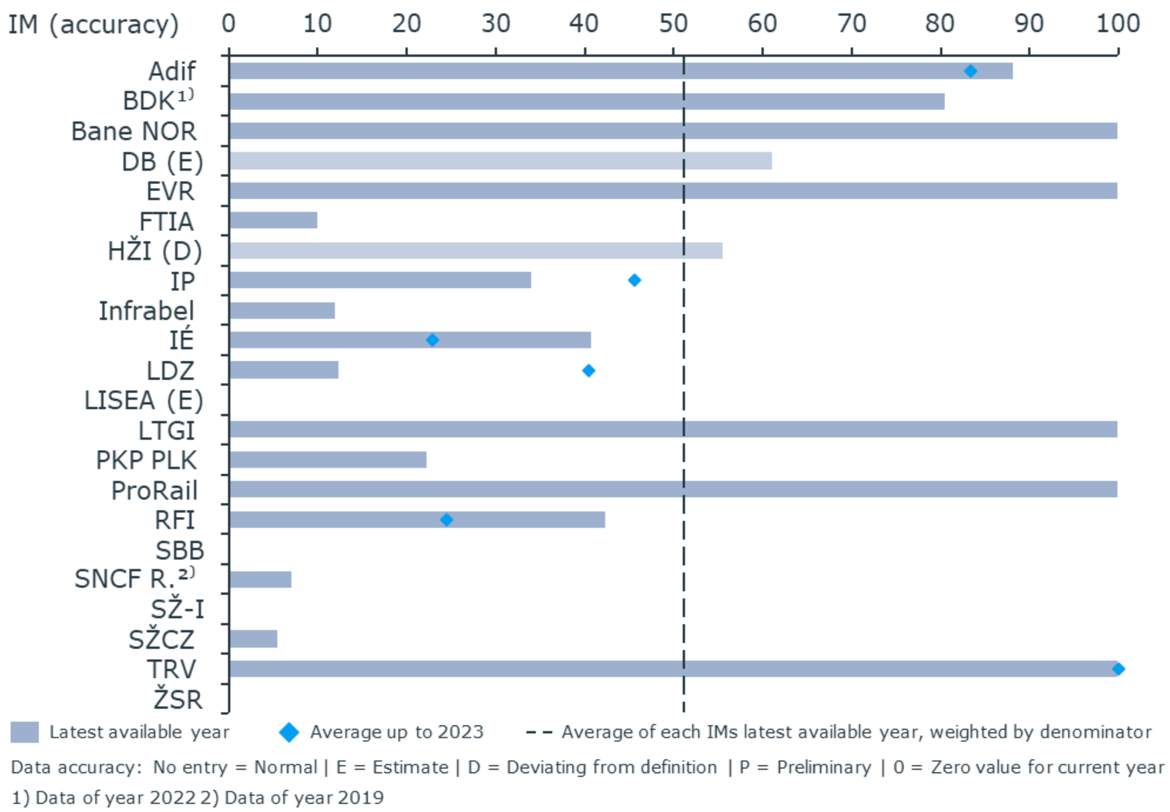

Figure 67: Share of renewable energy excluding traction (% of kWh)

Figure 67 displays the proportion of renewable energy used, excluding traction energy. Consistent with the usage patterns for traction energy, the same infrastructure managers that sourced 100% of their traction energy from renewable sources also apply renewable energy for their other needs excluding traction. The average renewable energy usage for these purposes mirrors that of traction energy at 51%.

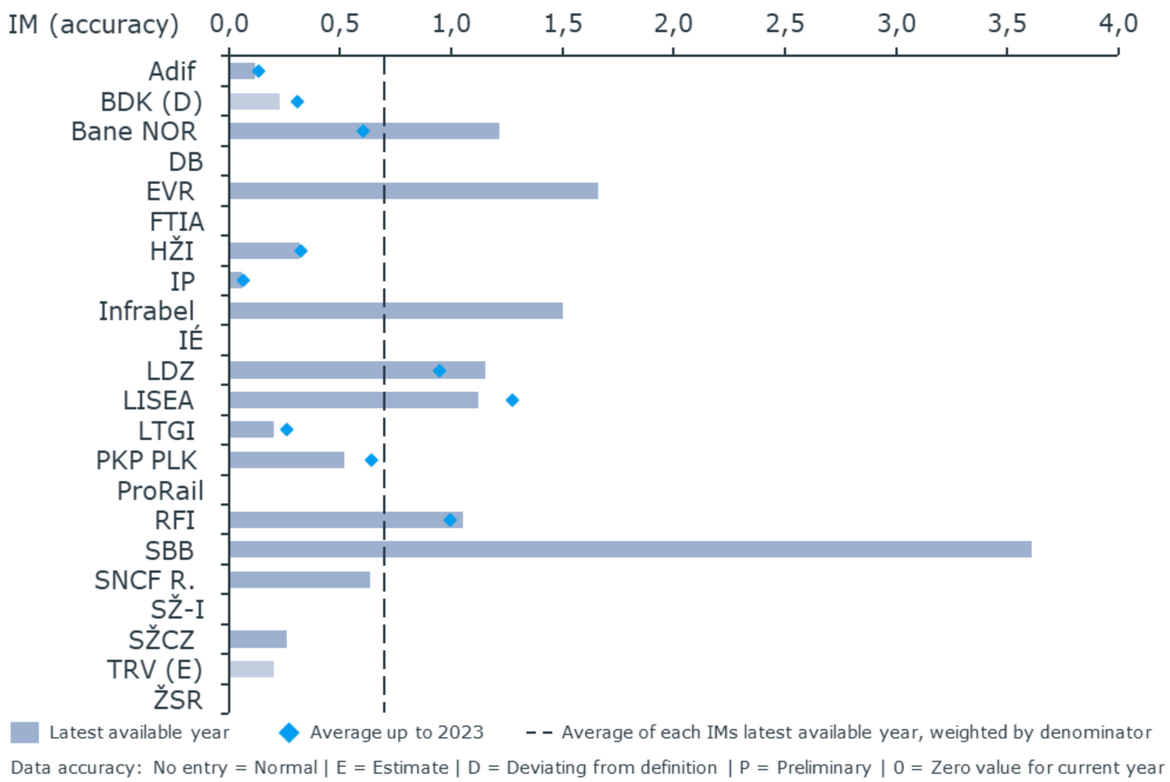

Figure 68: CO2 emission produced from IM's own maintenance rolling stock (tCO2 per main track-km)

Figure 68 captures the environmental impact of an infrastructure managers own maintenance rolling stock regarding its CO_2 emission. Its contribution to the overall emissions is small, however it is relevant to collect and analyse the data. As we can see, the emissions produced by rolling stock vary across the peer group and have an average of 0.7. However, it is important to note that the extent to which infrastructure managers outsource maintenance and the usage of maintenance rolling stock has a major impact on their CO_2 emission in this respect. The collected data do not include the CO_2 emissions of such subcontracting. SBB's relatively high diesel consumption is due to the fact, that a large part of its maintenance work is done with its own rolling stock (values based on estimation).

3.5 Performance and delivery

3.5.1 Summary of performance and delivery

EU-wide objectives

- Improving performance and increasing punctuality of passenger and freight rail services is an objective of every infrastructure manager.

EU-wide objectives

- Infrastructure managers establish targets and monitor them closely to develop appropriate activities and measure their effectiveness.
- EU legislation has established basic principles to minimise disruptions. Infrastructure charging schemes should encourage railway undertakings and the infrastructure manager to minimise disruption and improve the performance of the railway network through a performance scheme.

Peer group's performance

- PRIME has developed common definitions to increase the comparability of performance measures:
  - Passenger trains punctuality is measured with a threshold of 5:29 minutes.
  - Freight trains punctuality is measured with a threshold of 15:29 minutes.
- In the period of 2019-2023 passenger punctuality declined slightly for most infrastructure managers.
- Freight train punctuality increased for half of the peer group, while it decreased for the other half.
- On average infrastructure managers caused 5 delay minutes per thousand train-kilometres.
- The trend in the number of failures per main track-kilometre indicates a positive development, with an average reduction of almost 3%.

3.5.2 Development and benchmark of performance and delivery

Performance and delivery is a category in which increased customer demands are particularly visible. More frequent and more complex journeys require coordinated schedules and punctual trains. The logistic sector calls for plannability, traceability, and speed in transportation. Infrastructure managers are constantly working on improving their performance by increasing their punctuality and minimising the effect of failures to provide a reliable and available network.

Rail performance and delivery indicators

PRIME members are reporting three indicators measuring railway punctuality, two indicators measuring reliability and two indicators measuring availability:

- Punctuality:
  - Passenger trains' punctuality

  - Freight trains’ punctuality
  - Delay minutes caused by the infrastructure manager
- Reliability:
  - Asset failures in relation to network size
  - Average delay in minutes per asset failure
- Availability:
  - Tracks with permanent speed restrictions
  - Tracks with temporary speed restrictions

To increase comparability of these values among infrastructure managers, the train punctuality indicators are illustrated as a percentage of all trains scheduled, the delay minutes are related to train-kilometres and the number of asset failures as well as the speed restrictions are related to main track-kilometres.

3.5.3 Punctuality

Other than safety, train punctuality is the primary measure of overall railway performance and a key measure of quality of service, driven not only by the infrastructure manager but also operators, customers, and other external parties. It is a complex output that needs to be understood as the result of a system where many internal and external factors, different technologies, many actors and stakeholders come together and interact to produce a good service for passenger and freight customers.

Punctuality is measured and managed in very different ways, as performance schemes are not yet sufficiently coordinated between infrastructure managers. Different measurement concepts concern mainly the thresholds of punctuality and approaches regarding measurement points. Within the peer group the individual span of thresholds set to classify a train as delayed may differ by more than 10 minutes for passenger trains and more than 50 minutes for freight trains. The collection of the individual company standards that are used for national and company internal monitoring can be found in the Annex 4.5.

To promote good quality benchmarking, PRIME has established a common definition including an agreed threshold for each passenger and freight services. For passenger trains, punctuality indicators represent the percentage of operating national and international passenger trains which arrive at each strategic measuring point with a delay of less than or equal to 5:29 minutes. For freight trains the threshold has been set to 15:29 minutes. Several but not all infrastructure managers report their punctuality figures according to this definition. However, for some infrastructure managers this threshold is less favourable and difficult to align with internal company targets. Internal targets directly impact operational aspects like timetable planning. Specifically, the punctuality thresholds set by each IM play a crucial role in shaping overall scheduling strategies within timetable management. As already indicated, the other important component of measurement concepts is the approach regarding measuring points. The density of measurement points in networks can be as low as measuring at the final destination only, or as high as measuring at arrivals, destinations, and additional points. The density of measurement points can significantly impact the punctuality values of each IM. Therefore, this information should be carefully considered before analysing punctuality data.

The following table shows the different concepts with regards to measurement points in each infrastructure manager's network. The counting method and definition of strategic measuring points lays in the responsibility of the infrastructure managers and is not further harmonised by PRIME.

Infrastructure manager	Measurement points in the network
Adif	For statistical purposes at final destination only. For traffic regulation and management also at every station, in blocks and at some other strategic points like switches.
BDK	Passenger trains (commuter): 86 strategic measurement points Passenger trains (regional and long distance): 48 strategic measurement points Freight trains: 14 strategic measurement points
Bane NOR	PRIME punctuality performance measures are measured at final destination and at Oslo Central Station for both passenger and freight trains.
DB	For statistical purposes: Punctuality of passenger trains is measured at all stations. Punctuality of freight trains is measured at the final station (arrival) within Germany.
FTIA	For local trains the measurement is done both at the first and at last station, for all other trains only at arrival. Delays are measured at block signals on the line (but not used to calculate punctuality).
EVR	Measured at final destination
HŽI	For all trains, time is measured only at the destination (final relation station, or transfer to neighbouring infrastructure managers)
IÉ	Measured at final destination
Infrabel	Passenger trains: Measured at final destination and if applicable, it is measured at arrival at the first station in Brussels.

Infrastructure manager	Measurement points in the network
	Freight trains: at arrival or at moment of leaving the country
IP	Exclusively at the destination (all systems are prepared for the measurement to be performed on more stations. To this end, the stations to be selected will be all those that enhance commercial service or have technical characteristics for services requested by the operator)
LDZ	Strategic measurement points
LISEA	Stations and strategic measurement points across the network
LTGI	Measured at strategic points.
PKP PLK	For statistical purposes, time measured at the destination (final relation station, or transfer to neighbouring infrastructure manager). The possibility of measurement exists at any point where the arrival / departure time of the train is described.
ProRail	Strategic measurement points
RFI	Final destination for punctuality purpose
SBB	Passenger trains: 53 strategic measurement points (large stations). Freight trains: 52 strategic measurement points (specific freight operating points).
SNCF R.	Measurements of punctuality are drawn from strategic and near-stations points.
SŽCZ	For statistical purposes: • Origin point of a train or arriving border station in case of cross-border train (transfer from other infrastructure manager) • Final destination point or departing border station in case of cross-border train (transfer to other infrastructure manager)
SŽ-I	Final destination for punctuality purpose.
TRV	Official performance measures measured at final destination only. Many more measuring points exist but are not calculated in the performance measures.

Infrastructure manager	Measurement points in the network
ŽSR	For passenger trains, the measurement points are at every station, but fulfilment of timetable is calculated based on measuring on arrival and sometimes departure, if needed. Same measurement points are applicable for freight trains, but the fulfilment of timetabling is not calculated unless demanded by an entity/authority.

Table 2: Infrastructure manager’s measurement points in the network

Passenger total train punctuality (5:29 minutes)

Figure 69 and Figure 70 show the punctuality of passenger trains for operators using the network of PRIME members as a benchmark and over the time-period 2019-2023. It is important to note that punctuality figures presented here are not solely the result of the infrastructure manager’s performance but also include delays caused by operators and other parties as well as external causes, hence representing full system-punctuality.

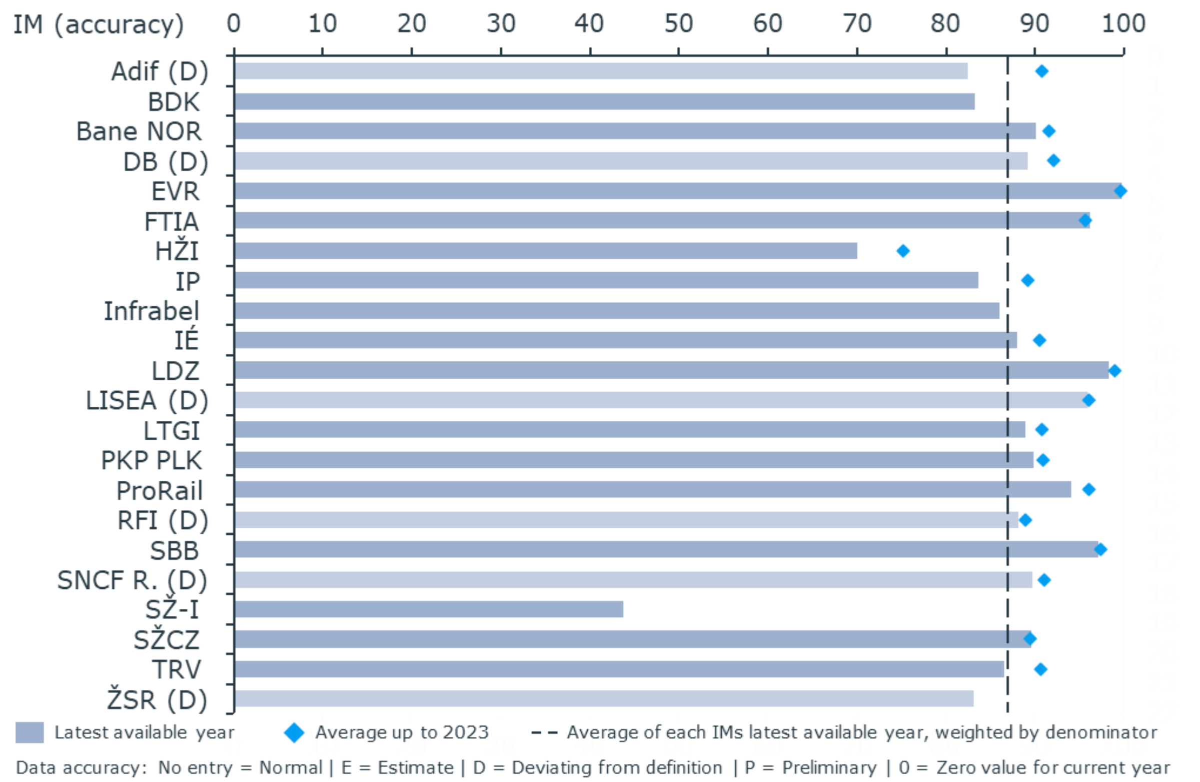

Figure 69: Passenger trains total punctuality (5:29 minutes) (% of operating trains)

Figure 69 shows the passenger train punctuality data of the latest available year. The figures vary between 44% and 99%, which is again partly a result of different measuring methodologies. The punctuality of passenger trains has a weighted average of 89% and a standard deviation of 12%. SŽ-I has a lower value as a lot of tracks are closed due to intensive upgrading and maintenance works on the railway network. The lighter grey colour highlights the infrastructure managers which deviate from the PRIME definition. Infrastructure managers are constantly working on aligning their punctuality thresholds to the PRIME definition. In total, three infrastructure managers are deviating from definition. Comments explaining in what sense the individual data points are deviating are collected in the Annex 4.3.

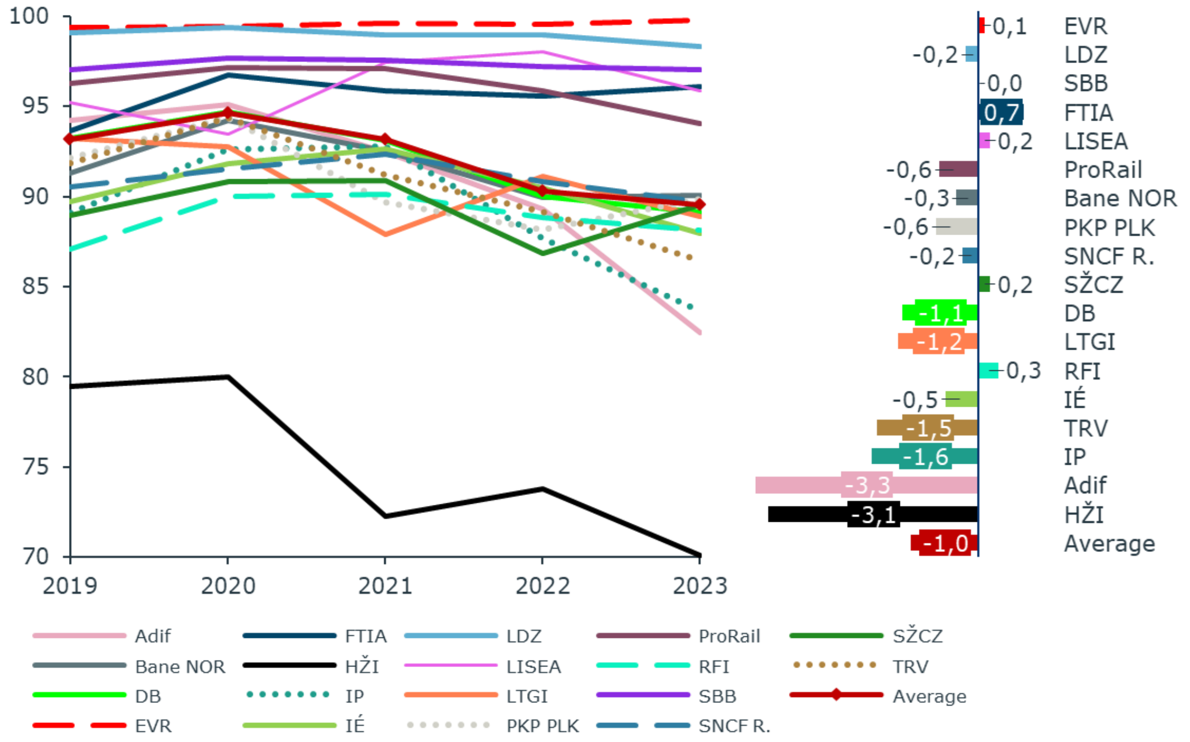

Figure 70: Passenger trains total punctuality (5:29 minutes) (% of operating trains) and CAGR (%) in 2019-2023

Figure 70 illustrates the development of passenger train punctuality from 2019 to 2023. The majority of infrastructure managers experienced a decline in punctuality in this period. The highest punctuality rates were in 2020 which were connected to the lower train activity during the pandemic. Specifically in 2022 and 2023 the punctuality rates decreased. On average the development in this period was -1%. The rather notable decrease of Adif and HŽI was primarily caused due to extensive track maintenance and renewal works that is done on the network.

Beyond differences in measuring concepts, several other factors influence punctuality, some of which are beyond the infrastructure manager's control. Network complexity and utilisation are among the most significant. Networks with a higher proportion of regional traffic tend to achieve better punctuality than those dominated by long-distance traffic. The risk of delays due to failures increases with greater complexity. For instance, networks with a high density of assets, such as switches and level crossings, are more susceptible to failures and require frequent interventions, including maintenance and renewal activities.

Construction works can also impact punctuality by temporarily reducing line performance, as they limit buffer capacity and operational flexibility during the construction phase. Similarly, network utilisation plays a key role: the higher the utilisation (expressed in train-kilometres per track-kilometre), the greater the wear and tear, operational conflicts, and train-affecting disturbances. As utilisation increases, so do knock-on effects on punctuality. At the same time, higher utilisation leaves less margin for error, making precise timetabling and high infrastructure quality essential.

As shown in Figures 23 and 24, these challenges lead to higher operational costs for infrastructure managers, as demonstrated by the cases of SBB and ProRail. However, the need for additional CAPEX is less straightforward, given competing priorities such as enhancements, renewals, and safety requirements. This complexity makes it more challenging to establish a direct correlation between CAPEX and other key performance indicators.

One should bear in mind that punctuality, however, results from a complex and long-term set of parameters; a meaningful analysis cannot be limited to one year.

Poor asset condition might also lead to a higher number of failures and increased repair time. Response times to failures and time needed to repair determine the infrastructure managers' capability to recover the assets availability and return to normal traffic operation. Condition of the rolling stock, which is a responsibility of the operator, as well as weather conditions, are factors that are perfectly independent from the infrastructure manager, but still do influence punctuality to a significant degree.

Freight total train punctuality (15:29 minutes)

Figure 71 and Figure 72 show the punctuality of freight trains of PRIME members in a latest benchmark and over the period 2019-2023.

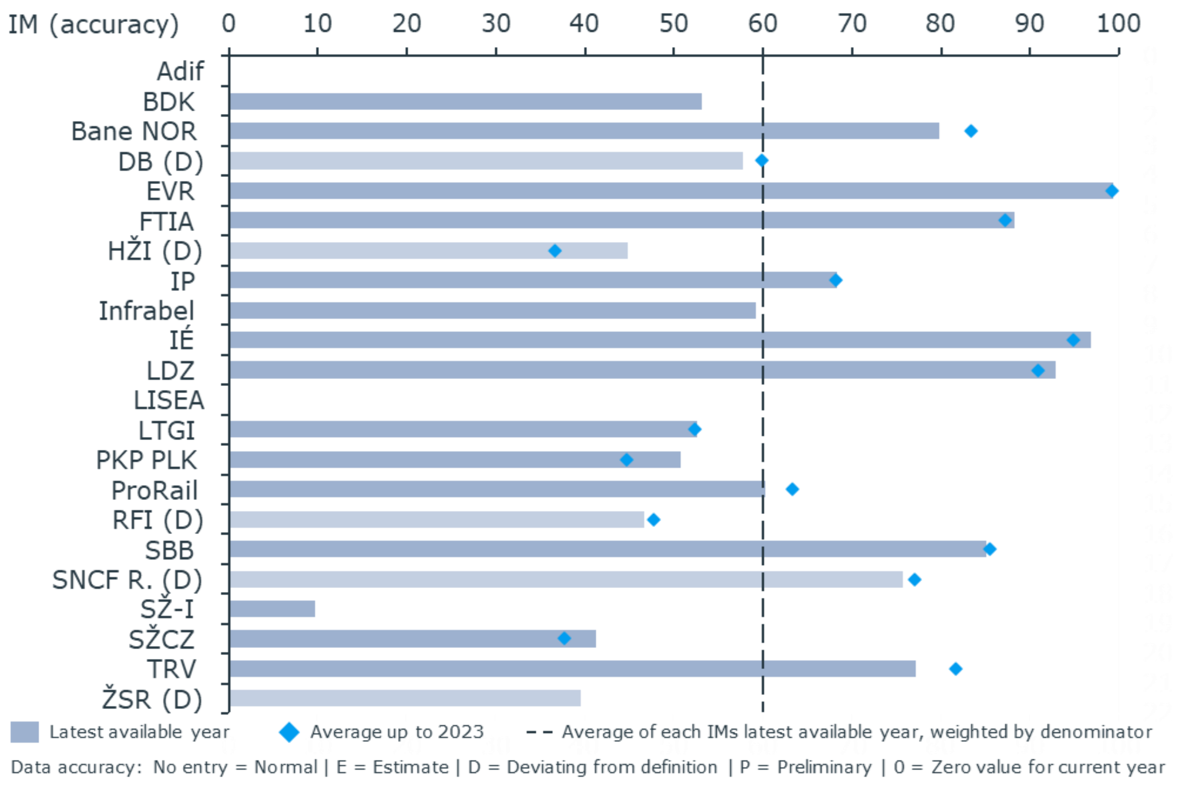

Figure 71: Freight trains total punctuality (15:29 minutes) (% of operating trains)

Compared to passenger train services, the percentage of freight trains on time is lower and has an average of 60%. Also, the spread within the peer group is higher: the punctualities range between 10% and 99% and have a standard deviation of 27%. EVR has the highest punctuality of almost all trains arriving on time, followed by IE and LDZ. The lowest punctuality has SZ-I. DB’s punctuality measuring is deviating from the definition: this is marked in lighter grey in the graph and the deviation explained in the Annex 4.3. LISEA has no data, as they are no freight trains running on the network.

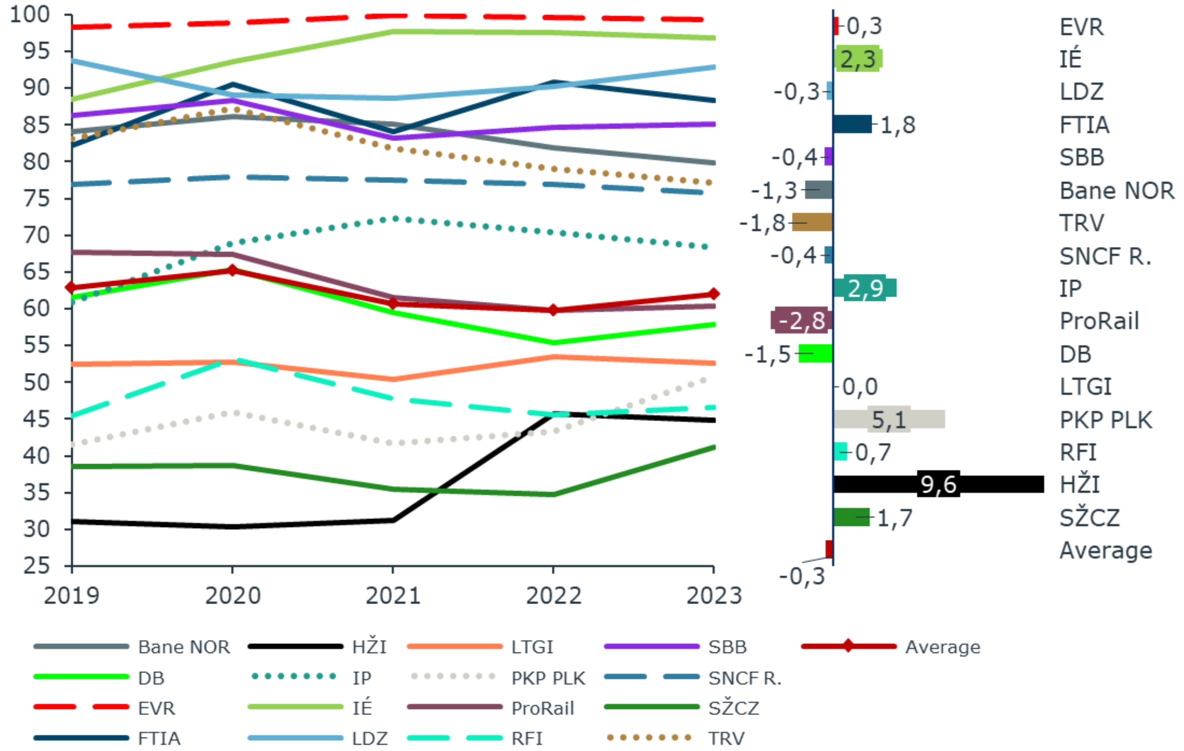

Figure 72: Freight trains total punctuality (15:29 minutes) (% of operating trains) and CAGR (%) in 2019-2023

Figure 72 shows the development of freight train punctuality between 2019 and 2023. Out of sixteen infrastructure managers that submitted data for the entire timeframe, half of them reported improvements in their punctuality rates and half of them showed a decrease. The rise that HŽI experienced in 2022, is mainly attributed to a surge in ad hoc freight trains, which are excluded from the statistics.

Factors influencing punctuality of freight trains are like the ones described for passenger train services. In addition, freight train services run for a large part on international routes and over long distances, which makes them more vulnerable to disturbances. Another impact on punctuality in freight transport is caused by the fact that freight trains run mainly at night. Maintenance and minor renewal works are mainly carried out at night to not, or only slightly, affect passenger traffic, which is often prioritized. Due to this, freight trains may be affected more frequently, especially by short-term repair and maintenance work, with a negative impact on punctuality.

Delays caused by infrastructure managers

As illustrated before, punctuality depends on a wide array of different factors and must be interpreted as a systemic result. Hence, the number of delay minutes accrued should be distinguished between those caused by the infrastructure managers and others. In general, only 20-30% of unpunctuality is caused by infrastructure managers.

Delay minutes caused by infrastructure managers

According to the PRIME KPI & Benchmarking subgroup delays caused by infrastructure managers can be allocated to one of these four categories: operational planning, infrastructure installations, civil engineering causes, causes of other infrastructure managers.

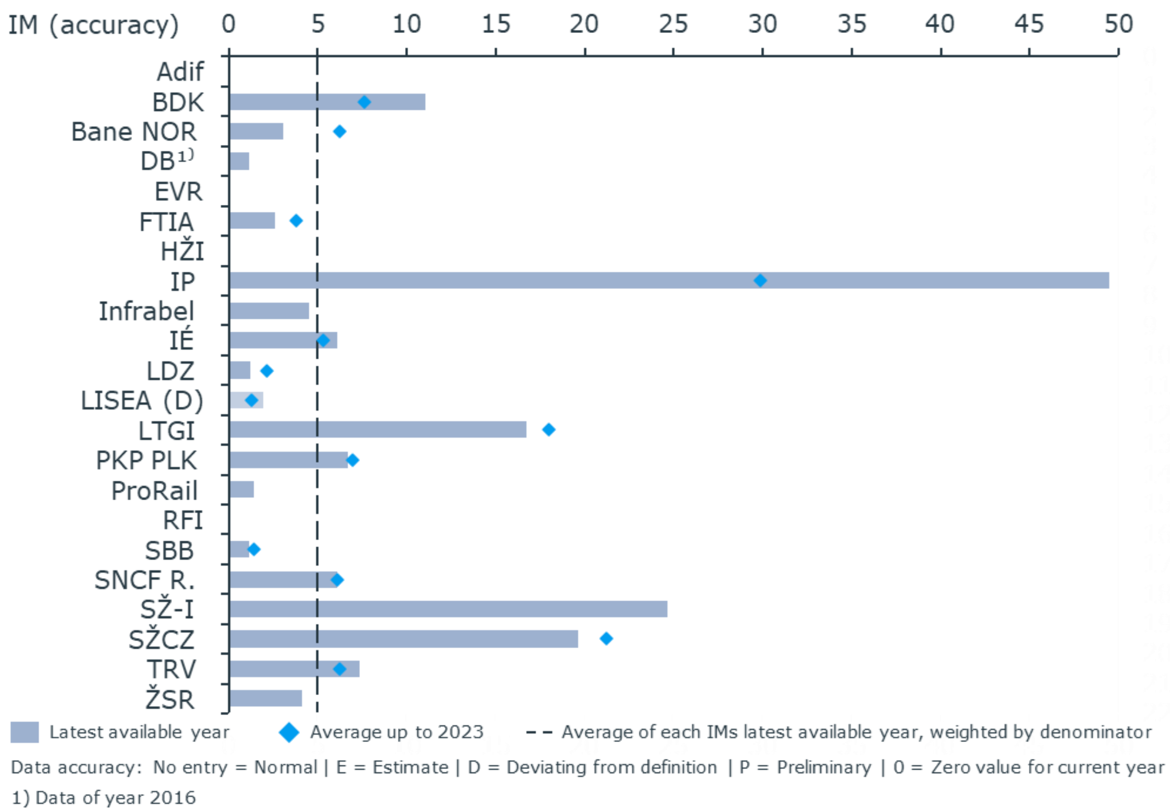

Figure 73: Delay minutes per train-km caused by the infrastructure manager (Minutes per thousand train-km)

On average infrastructure managers caused 5 delay minutes per thousand train-kilometres, and their results vary between less than 1 and 41 minutes per thousand train-kilometres. The lowest level of delay minutes caused by the infrastructure manager can be seen for SBB, LDZ and LISEA. IP's relatively high value can partly be explained by the restrictive cancellation policy of the Portuguese Rail system, and the way cancellations are treated in performance statistics according to which it is more acceptable to continue to delay a train rather than to cancel it. Furthermore, the current investment program in the Portuguese railway network in building, enhancing and renewing infrastructure is lasting until 2023.

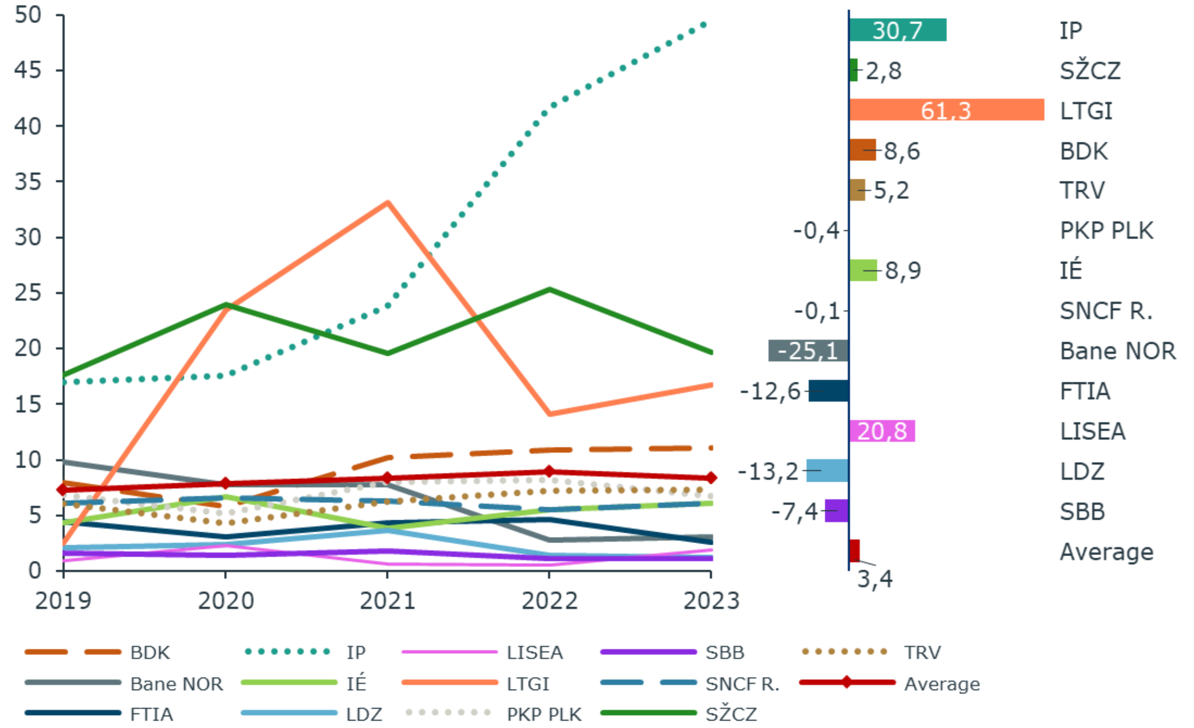

Figure 74: Delay minutes per train-km caused by the infrastructure manager (Minutes per thousand train-km) and CAGR (%) in 2019-2023

The number of delay minutes per train-kilometre caused by the infrastructure manager have increased in more than half of the companies. LTGI and and IP had the highest annual growth rates with 61.3% and 30.7% respectively.

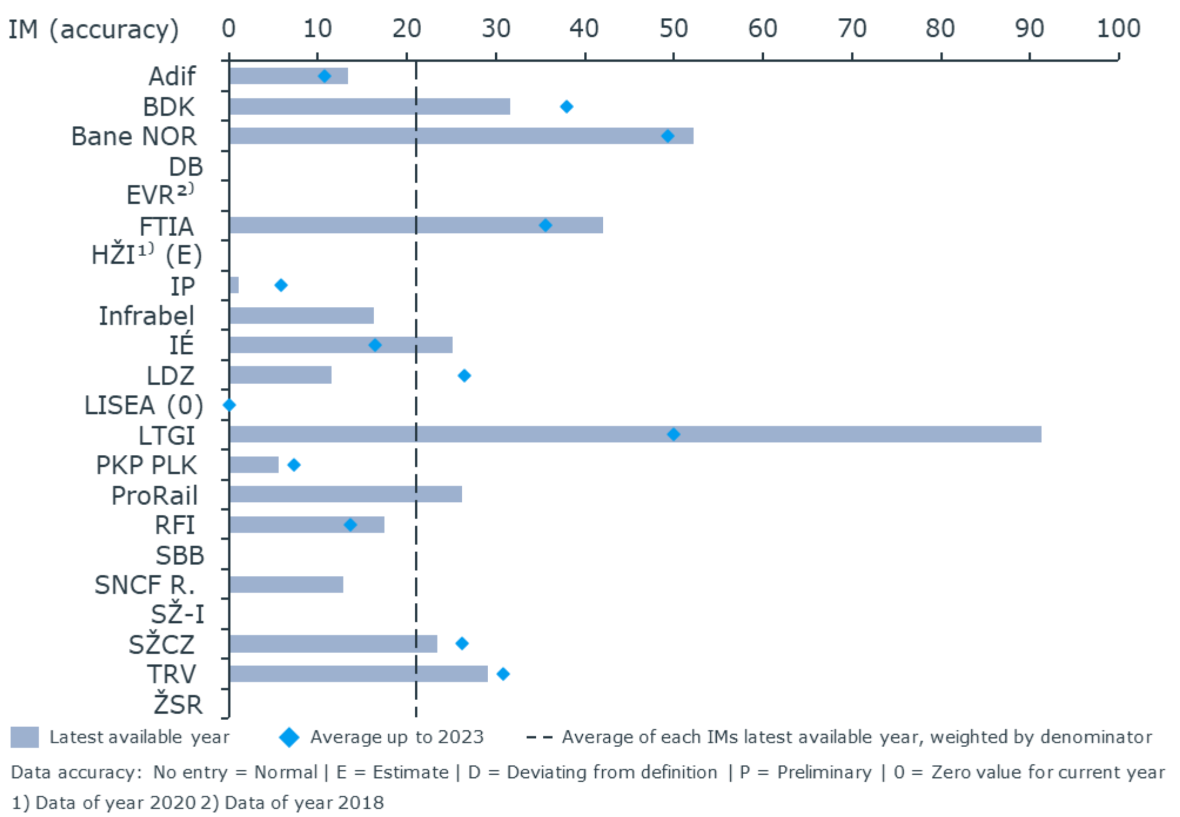

Figure 75: Passenger train cancellations caused by the infrastructure manager (% of scheduled and cancelled passenger trains)

As illustrated in Figure 75 the percentage of train cancellations caused by infrastructure managers varies widely, some showing levels well below the weighted average while others have significantly higher values. On average 21% of train cancellations were the infrastructure managers' responsibility; the standard deviation is 23%. LTGI's high level of cancellation is mainly caused by a track electrification project initiated in 2022, which has some traffic management changes and train cancellations as a consequence.

Besides different measuring concepts, cancellation policies vary between the infrastructure managers. Infrastructure managers apply different practices with regards to the number of trains cancelled and the way they are treated in performance statistics. Some infrastructure managers consider long delays above a fixed threshold as a cancellation while others do not have a fixed threshold and cancel trains according to the timetable reprogramming. Following a restrictive cancellation policy could make it more difficult to achieve punctuality goals.

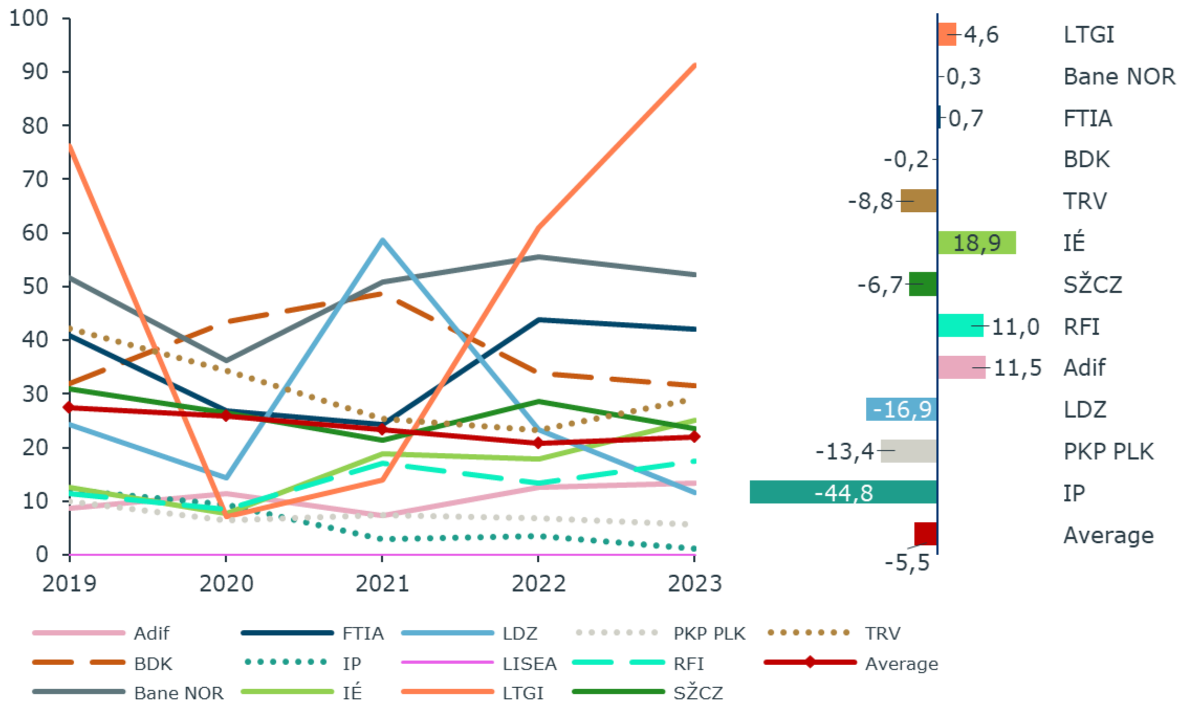

Figure 76: Percentage of passenger train cancellations caused by the infrastructure manager (% of scheduled and cancelled passenger trains) and CAGR (%) in 2019-2023

The development of train cancelations caused by infrastructure managers show a divided picture. Half of the companies have decreased their cancelations, while the other half recorded an increasing trend over the years. On average, this meant a decrease of 5.5%. The most significant decrease can be seen for IP.

3.5.4 Reliability

Reliability reflects the probability that railway systems or components will perform a required function for a given time when used under stated operating conditions. It is measured by counting failures which are affecting train operations. Many elements of the infrastructure manager's asset management system are geared to improve asset reliability, including regular condition monitoring of assets, renewal programs, as well as predictive and preventive maintenance concepts.

Development and benchmark

Figure 77 and Figure 78 show the latest benchmark of the number of train-affecting asset failures between the infrastructure managers and its development over the period of 2019-2023. An asset failure is counted one time and one time only in the data if any train is affected by it. A train is affected if the asset failure causes the train to exceed a delay minutes threshold of 5:29 minutes for passenger services or 15:29 minutes for freight services at any available measuring point. Cancelled trains are not included.

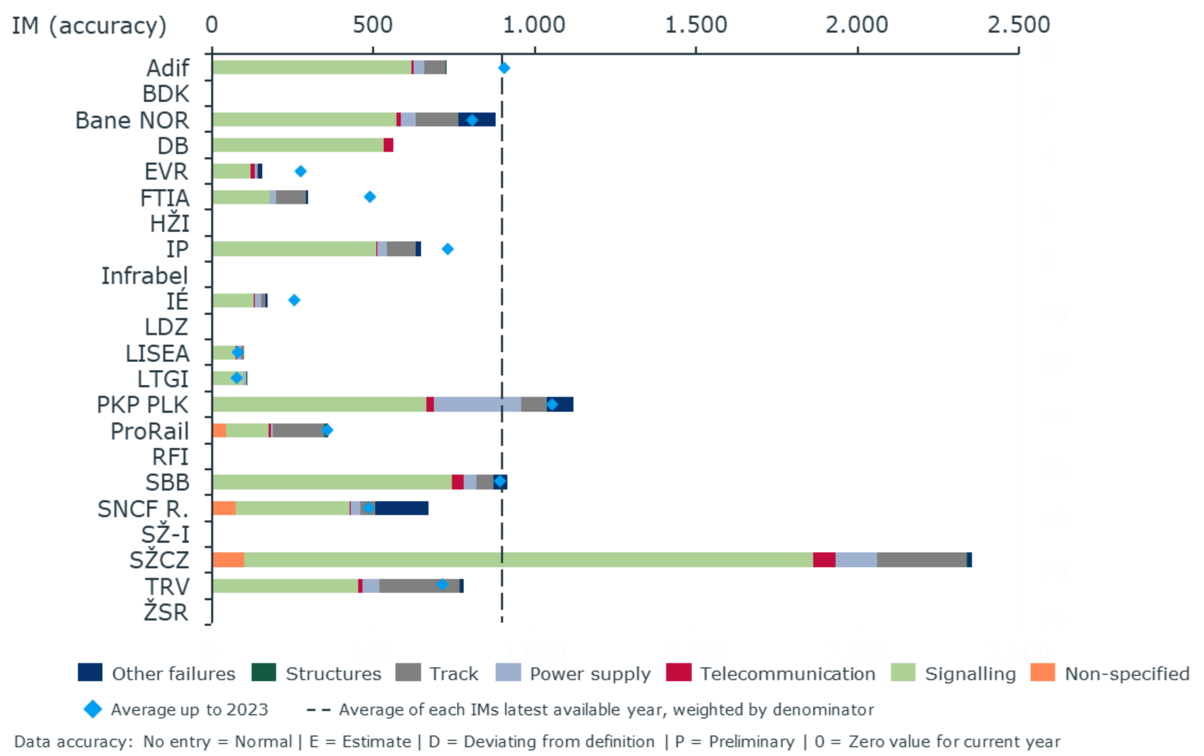

Figure 77: Asset failures in relation to network size (Number per thousand main track km)

Figure 77 shows the level and the composition of asset failures that caused delays. On average around 800 assets fail per thousand main track-kilometres per year. The failure frequency in the peer group varies between 55 and 2.400 failures per thousand main track-kilometres. Signalling accounts for most of all asset failures. Track is the second highest failing asset group. Failures of power supply and telecommunication assets are less common and, considering the overall number, the frequency of structural failures is negligible in most of the countries. The lighter green colour of DB indicates deviating figures for signalling failures, the lighter red of DB for telecommunication failures. In what sense these data are deviating is explained in Annex 4.3.

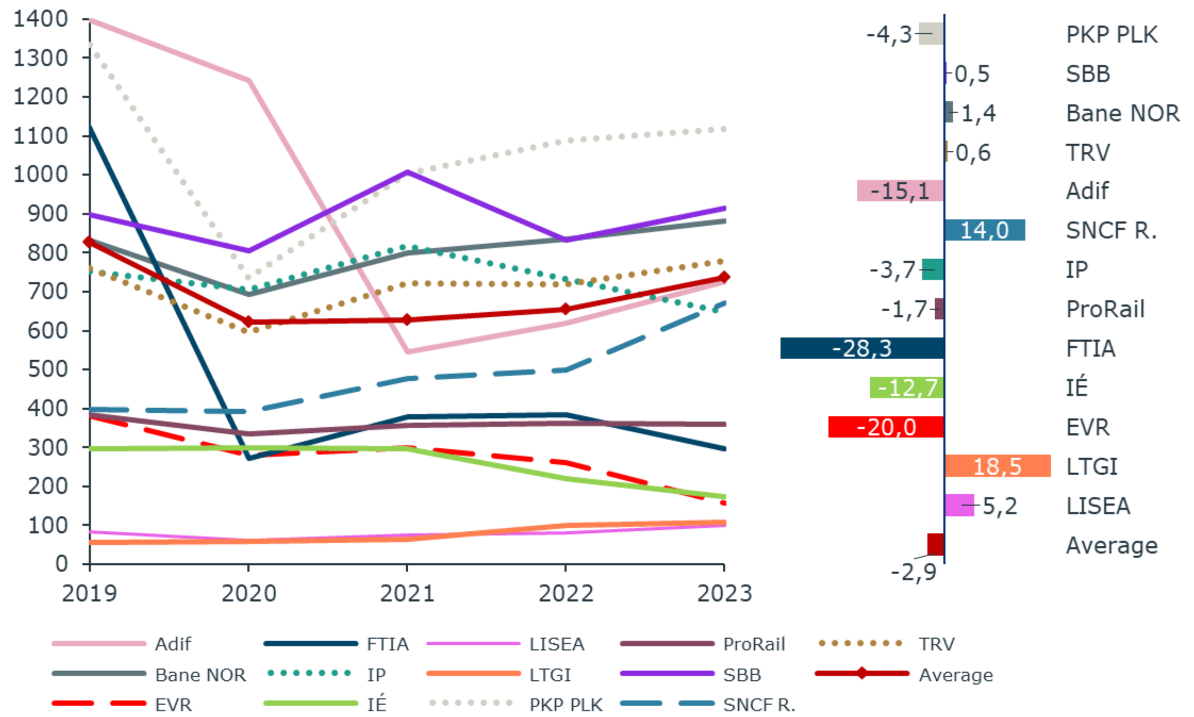

Figure 78: Asset failures in relation to network size (Number per thousand main track-km) and CAGR (%) in 2019-2023

The trend in the number of failures per main track-kilometre indicates a positive development, with an average reduction of almost 3%. Adif reported the most substantial decrease, a change that can be attributed to an alteration in the internal definition and method of data collection.

Regarding the counting of asset failures, it is important to note that in the railway infrastructure there are several incidents affecting regular train operations. In this benchmarking an incident is counted as an asset failure, one time and one time only, if at least one passenger train is delayed by 5:29 minutes or one freight train by 15:29 minutes. Incidents that are handled with cancelation of trains, deferred lasting solution with limited slow zones, several affected trains each with less delay than thresholds, deteriorating failures that don't affect the timetables etc. do not count as asset failures in this context.

While asset failures have an impact on almost all performance indicators, such as finance, safety, punctuality and reliability, there are several factors which determine the frequency and dimension of asset failures. Complexity (electrification, switch density and signalling) naturally increases the chances of failures, and high utilisation accelerates wear and tear. The condition, age and renewal rate of assets is also decisive. However, asset failure also depends on several factors such as stage of development, historic elements, and the budget of the infrastructure manager and the Member State concerned. Prevention policies, good maintenance/renewal management, and failure recording technologies might help to identify failing assets at an early stage and allow effective measures to be taken before consequences grow.

Geographical risks such as earthquakes, floods and landslides might cause severe damage, and extreme weather conditions such as extreme heat can cause rail buckling and broken rails. Infrastructure managers must be prepared as extreme weather events, such as storms, rainfall and extreme temperature fluctuations are becoming increasingly common.

The magnitude of the impact of asset failures on delays and their development over the period is shown in Figure 79 and Figure 80. Cancelled trains are not included in the calculation of delay minutes.

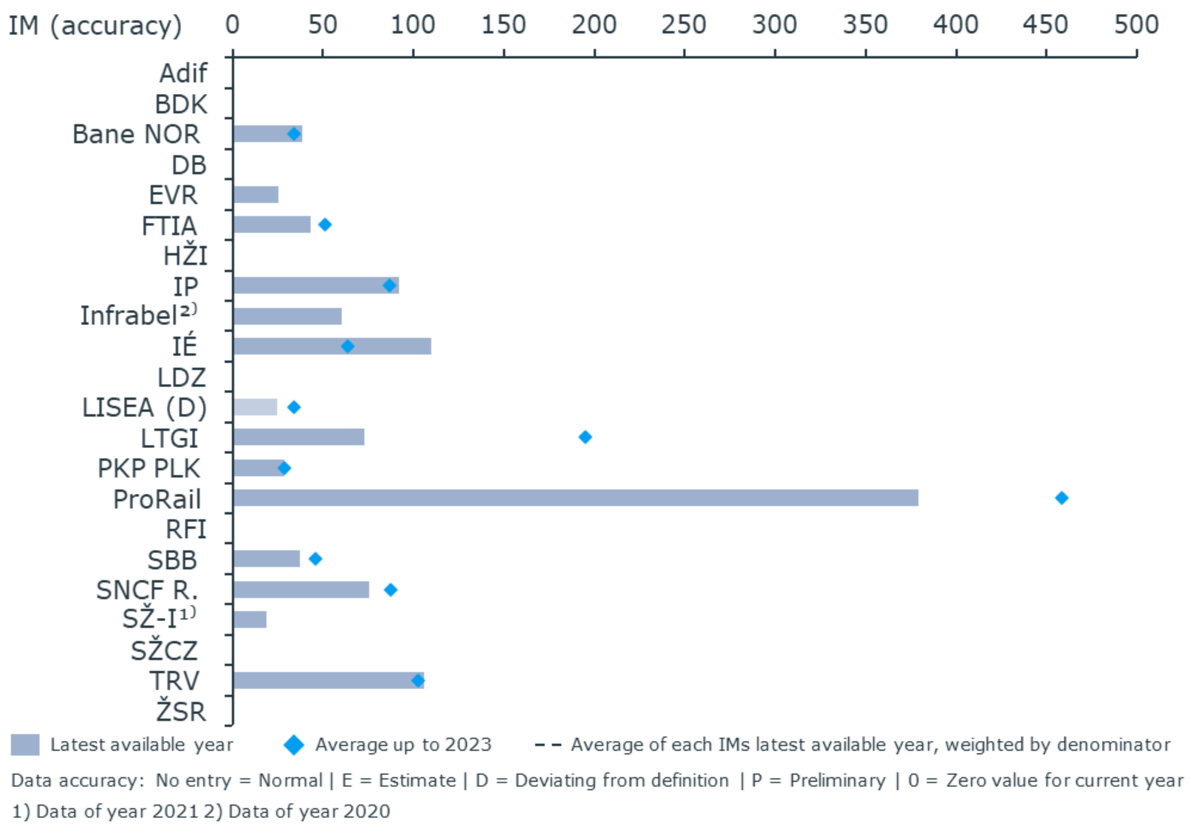

Figure 79: Average delay minutes per asset failure (Minutes per failure)

Figure 79 shows the impact that asset failures have on delay minutes. SŽCZ has by far the highest delay minutes per asset failure with 2551 minutes, which is not illustrated in this chart for the sake of visualisation. This high value significantly contributes to a weighted average of 580 minutes per failure, which is not illustrated for the sake of visualisation as well. Excluding SŽCZ would result in an average of 80 minutes, a value which is close to the individual results of the infrastructure manager. The lowest level of delay minutes caused by asset failures are found at SŽ-I, where one asset failure causes on average a delay of below 30 minutes.

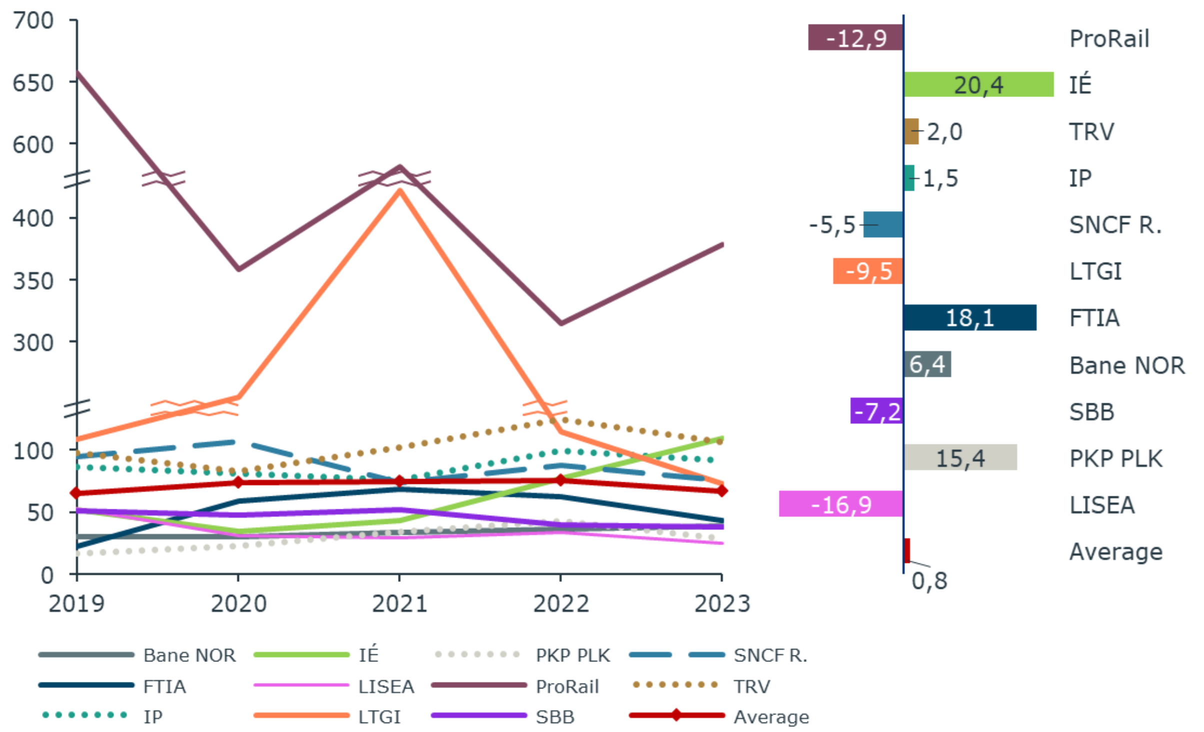

Figure 80: Average delay minutes per asset failure (Minutes per failure) and CAGR (%) in 2019-2023

Figure 80 shows the development of the average delays caused by an asset failure. As shown in the graph, the trends within the peer group vary rather significantly. While ProRail and LTGI exhibit highly fluctuating values and a greater impact on delay minutes, other infrastructure managers show smaller fluctuations over the same period.

It is important to note that the documentation of delay minutes and asset failures is a complex issue, with methodologies varying between infrastructure managers. This discrepancy should be considered when interpreting the data.

The magnitude of delays caused by asset failures highly depends on the type of asset involved. By relating the frequency of individual asset failures to the delay minutes caused, the impact on punctuality becomes visible. Figure 81 shows this relationship.

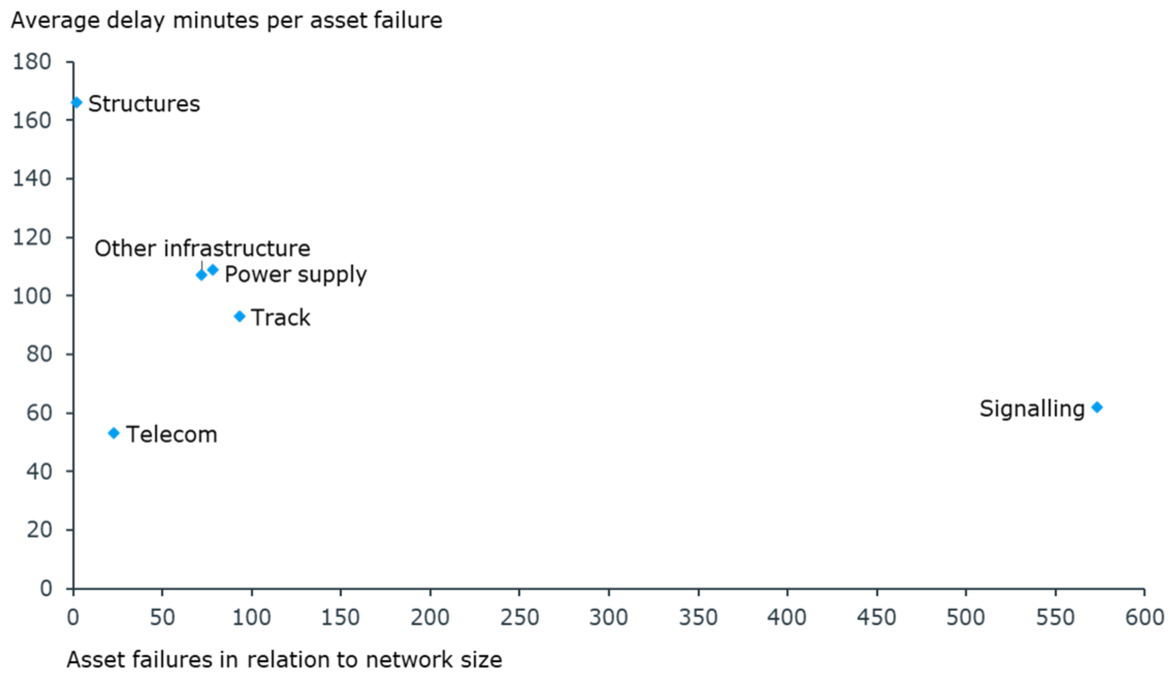

Figure 81: Average maximum delay per asset failure (Minutes per failure) / Asset failures (Number per thousand main track-km) [42]

Structure assets such as bridges and tunnels caused the second highest number of delay minutes with almost 166 minutes per failure. Power supply failures and track failures caused on average around 109 delay minutes. Telecommunication failures were responsible for an average delay of almost 53 minutes per failure. The most frequent type of asset failures was related to signalling, with an average of over 570 failures per thousand main track-kilometre, however they had a comparably low impact of 62 delay minutes per failure on average.

As Figure 81 shows, structural failures often result in high delays but occur infrequently, whereas signaling failures are more frequent but typically cause shorter delays. Nevertheless, due to their high occurrence, the total delay from signaling failures often exceeds that of structural failures.

However, the type of asset failures is not the only driving factor. High utilisation increases knock-on effects. Particularly on very busy routes, one single disruption can cause several knock-on delays. The knock-on might affect the traffic on the route where the disruption happened, plus on any connecting tracks, resulting in secondary delays.

Having well-organised maintenance planning and good response times are important when it comes to managing failures. Efficient contingency plans, good communication with operators, and the ability to quickly alter timetables are essential for minimising delays.

[42] Average indicates the weighted average within the peer group.

3.5.5 Availability

Availability of the infrastructure reflects the state of an asset and its usability for its intended purpose. As well as managing its assets in such a way as to minimise the effect of failures on the railway, availability indicators also measure the effectiveness and timeliness of the infrastructure manager in responding to these failures and returning the network to normal function.

Temporary and permanent speed restrictions have an overall impact on the availability of railway infrastructure, and can lead to delays, breakdowns and longer travel times. Speed restrictions are imposed on the railway to ensure safe use of the infrastructure and are applied when track renewals or regular maintenance work are carried out. However, it is often important to relieve the infrastructure by reducing speed limits even before maintenance work is started.

Development and benchmark

Figure 82 and Figure 83 show to what degree a network was affected by permanent or temporary speed restrictions. Due to incomplete time series, no trend line is shown for these two indicators.

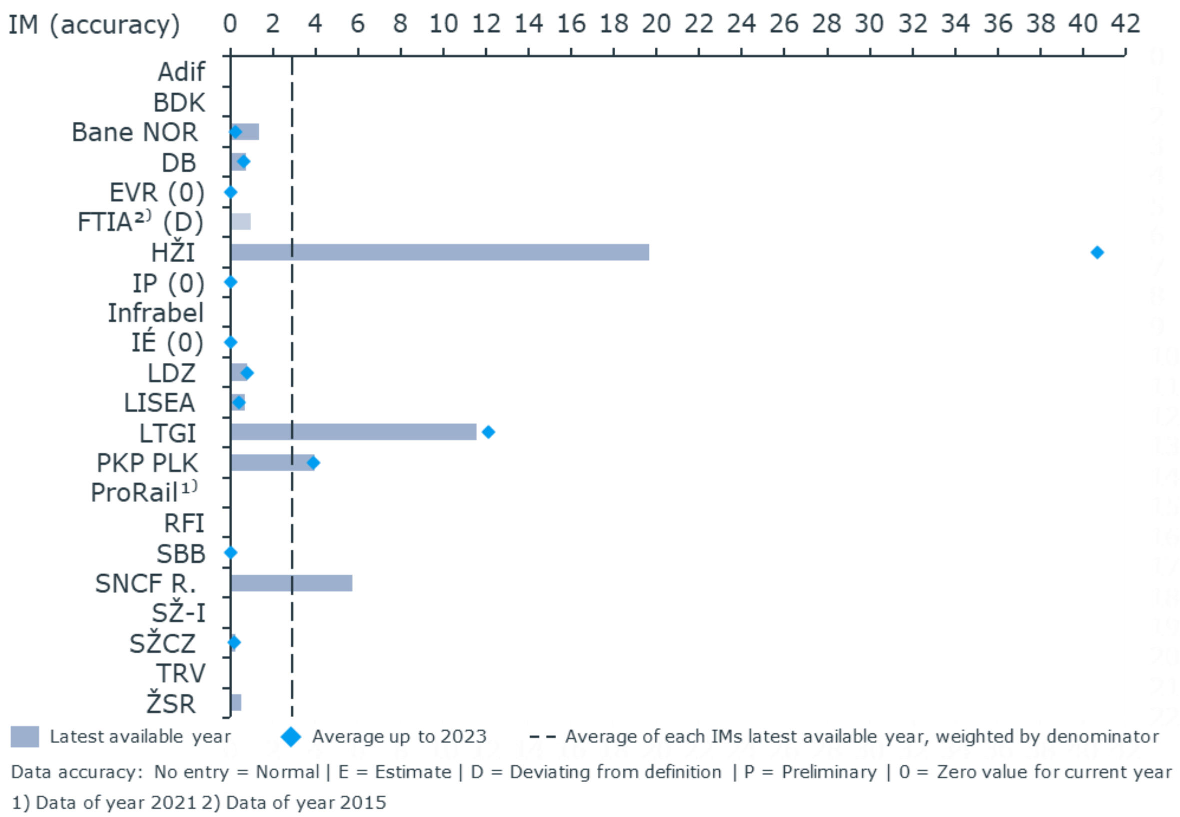

Figure 82: Tracks with permanent speed restrictions (% of main track-km)

Permanent speed restrictions are classified as such when they are included into the annual timetable. Most infrastructure managers report that less than 1% of their tracks are subject to permanent speed restrictions. The overall average of

2.8% for main track is largely affected by HŽI, which stands out as an outlier. For HŽI, the permanent speed restrictions result from the deteriorating condition of its local and regional lines. Nonetheless, HŽI was able to reduce the share of tracks with permanent speed restrictions from 53% in 2022 to 20% in 2023. It is important to note that some infrastructure managers do not separately account for permanent speed restrictions since they are factored into the operational timetable.

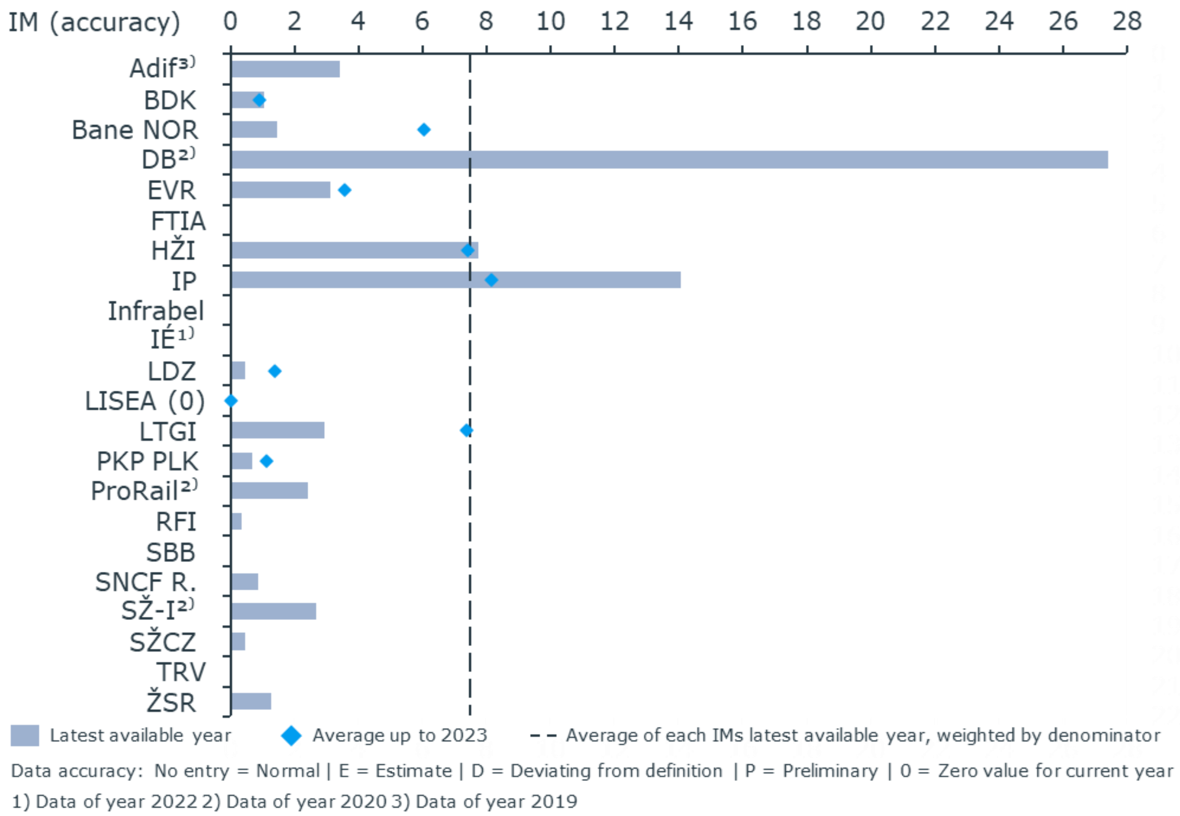

Figure 83: Tracks with temporary speed restrictions (% of main track-km)

Other than permanent speed restrictions, restrictions that occur during the year and are not included in the annual timetable are considered temporary. On average, 8% of the main track is limited in availability due to temporary speed restrictions, which are typically caused by deteriorating conditions or necessary track works. While nine infrastructure managers had less than 2% of main track-km submitted to a temporary speed restriction IP and DB restrict speed on more than 10% of their networks. HŽI indicated that, the temporary speed restriction in 2021 increased due to track overhaul works on international (TEN-T) lines, and on the other hand, due to bad track condition on local lines and poor visibility at level crossings on some regional lines. IP's temporary speed restrictions are mainly due to an investment program in the Portuguese railway network, building, enhancing, and renewing infrastructure.

Speed restrictions are usually set by the infrastructure manager in consultation with train operators. For how long speed restrictions last and whether the temporary ones become permanent mainly depends on the funding agreements and the budget of the infrastructure managers for maintenance and renewal. It is also relevant how utilised the affected routes are, and whether there are branch lines that can be used during the maintenance works. Reducing speed to extend service life is sometimes the better option than interrupting a very active route for a longer period.

3.6 Asset capability and ERTMS deployment

3.6.1 Summary of asset capability and ERTMS deployment

EU-wide objectives

- Digitalisation is one of the key pillars of the European Commission's Sustainable and Smart Mobility Strategy. It is an indispensable driver for the modernisation of the entire system, making it seamless and more efficient. In the rail sector European Rail Traffic Management System (ERTMS) deployment plays a major role in this digital transformation.
- The main objectives of ERTMS are to increase safety, capacity as well as interoperability, harmonise automatic train control and communication systems throughout the European rail network, and act as the building block for the digitalisation of the rail network.
- The technical details of ERTMS are laid down in the CCS TSI (Control-Command and Signalling Technical Specification for Interoperability). The European Union Agency for Railways (ERA) is the ERTMS System Authority responsible for ensuring interoperable deployment as defined in the Fourth Railway Package.
- Based on the revised TEN-T Regulation from December 2021, the TEN-T network shall be gradually completed in three steps: 2030 for the core network, 2040 for the extended core network and 2050 for the comprehensive network. The core and extended core network together form the European Transport Corridors which are the most strategic part of the network with highest EU added value.
- Promotion of intermodality is a key goal of the European Commission and has the objective to develop a framework for an optimal integration of different transport modes to enable an efficient and cost-effective use of the transport system through seamless, customer-oriented door-to-door services whilst favouring competitions between transport operators.

Peer group's performance

- ERTMS deployment is highly heterogonous in the peer group.
- ERTMS is deployed on about 10% of all tracks of the peer group's railway network.
- Across the peer group ERTMS is expected to be implemented in about 32% of the railway network by 2030.
- Four infrastructure managers plan to have above 90% ERTMS coverage by 2030.
- ATP coverage has an average of 58%.
- The highest on average connection can be seen for inland waterways, the lowest for airports.

3.6.2 Development and benchmark of ERTMS and ATP

In the rail sector ERTMS deployment plays a major role in this digital transformation. ERTMS deployment is a significant investment but is crucial for infrastructure managers, as expected benefits of ERTMS deployment are significant, including increased safety, capacity, availability, and interoperability. ATP aims to improve rail safety and harmonisation to other transport modes.

ERTMS and ATP indicators

PRIME members are reporting three indicators measuring ERTMS deployment:

- ERTMS track-side deployment
- Planned extent of ERTMS deployment by 2030
- ATP coverage

To increase comparability of these values among infrastructure managers, these values are related to main track-kilometres.

Development and benchmark

Figure 84 shows the level of ERTMS track-side deployment and the planned extent of ERTMS deployment by 2030.

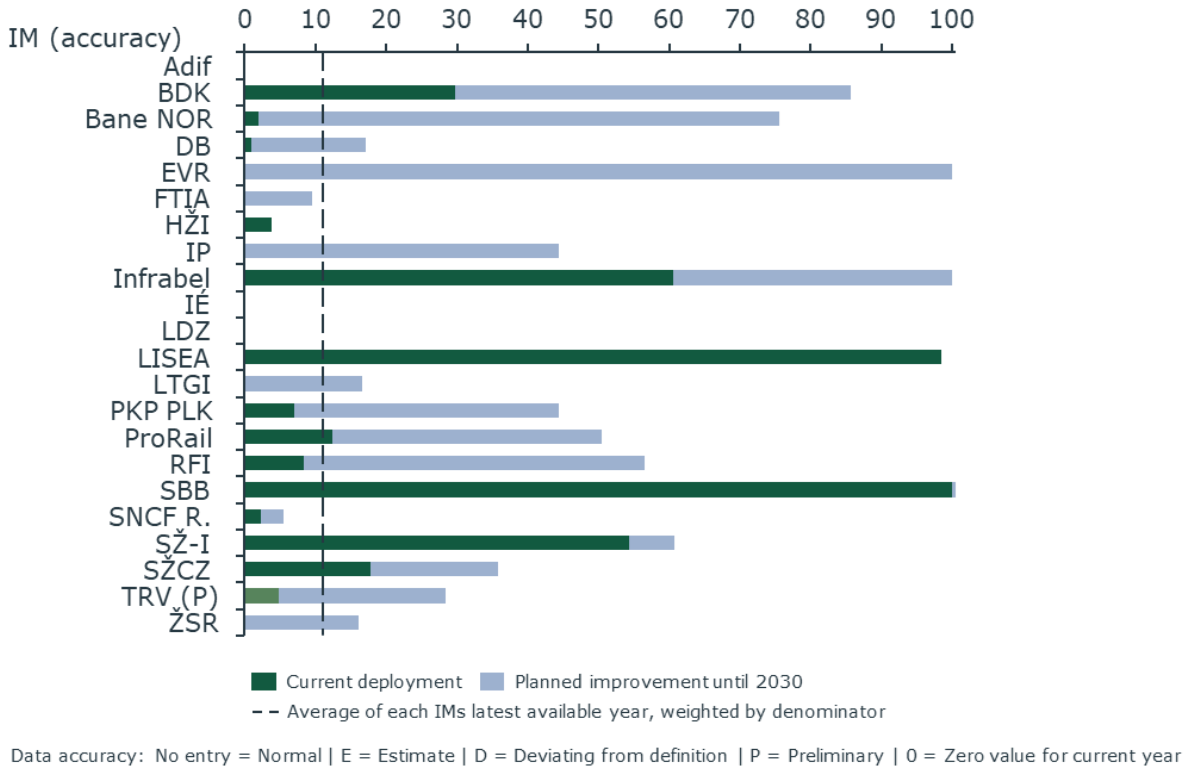

Figure 84: ERTMS track-side deployment, current deployment and planned improvement until 2030 (% of main track-km)

ERTMS is deployed on about 11% of all tracks of the peer group's railway network. The infrastructure managers' implementation strategies are heterogeneous, which is reflected by there being no ERTMS deployment in some countries vs. a high share in others of more than 90% (LISEA and SBB). Some infrastructure managers have different traffic management systems, for example LTGI's isolated network which does not require ERTMS deployment. Ireland, too, does not have to implement ERTMS as it does not have a border with another EU-country, however it has started to deploy a new management control system which is a combination of other systems.

By 2030, ERTMS is expected to cover about 30% of the peer group's railway network. For SBB the value is higher than 100%, as the future network will be larger than the current network and both are and will be entirely equipped with ERTMS. For BDK the value is not quite 100% since the Copenhagen S-bane is equipped with a similar system called CBTC instead of ERTMS since 2022. Other infrastructure managers which have above 90% deployment plans are EVR (100%) and Infrabel. It is important to note that considering the EU objective on ERTMS deployment, this indicator does not show the full picture, as it refers to the ERTMS deployment of the total main network and not only the TEN-T lines. It is also important to note that the numerator of this KPI (planned ERTMS deployment by 2030) refers to 2030 while the denominator (total main-track km) refers to 2023. If the whole network is planned to be equipped with ECTS by 2030, but will shrink between 2023 and 2030, the KPI is less than 100% even though ERTMS will be deployed on the whole network.

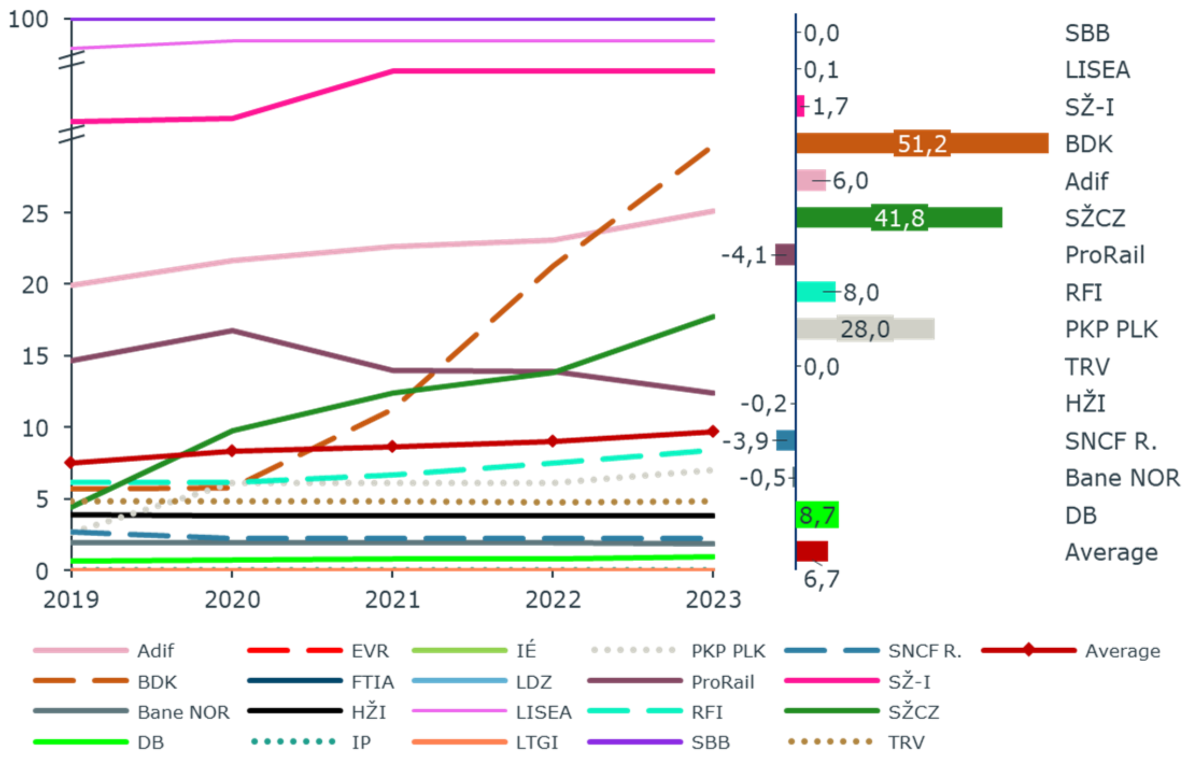

Figure 85: ERTMS track-side deployment (% of main track-km) and CAGR (%) in 2019-2023

Figure 85 shows the progress of ERTMS deployment on the different networks. The most significant expansion is observed at BDK, which increased its ERTMS coverage from 6% in 2019 to 30% in 2023. SŽCZ also showed significant progress, expanding its ERTMS-equipped network from 4% in 2019 to 18% in 2023. PKP PLK's notable increase is largely due to the commissioning of ETCS Level 2 on the Warsaw-Gdynia section of the E65 in 2020. On average, the use of ERTMS in the peer group has increased by almost 6.7% per year.

ATP coverage is an important indicator describing the functionality of rail infrastructure. The train protection scheme aims to support infrastructure managers in achieving the vision zero approach to eliminating transport-related fatalities in the European Union and includes ETCS, ATB, LZB, CBTC and similar systems.

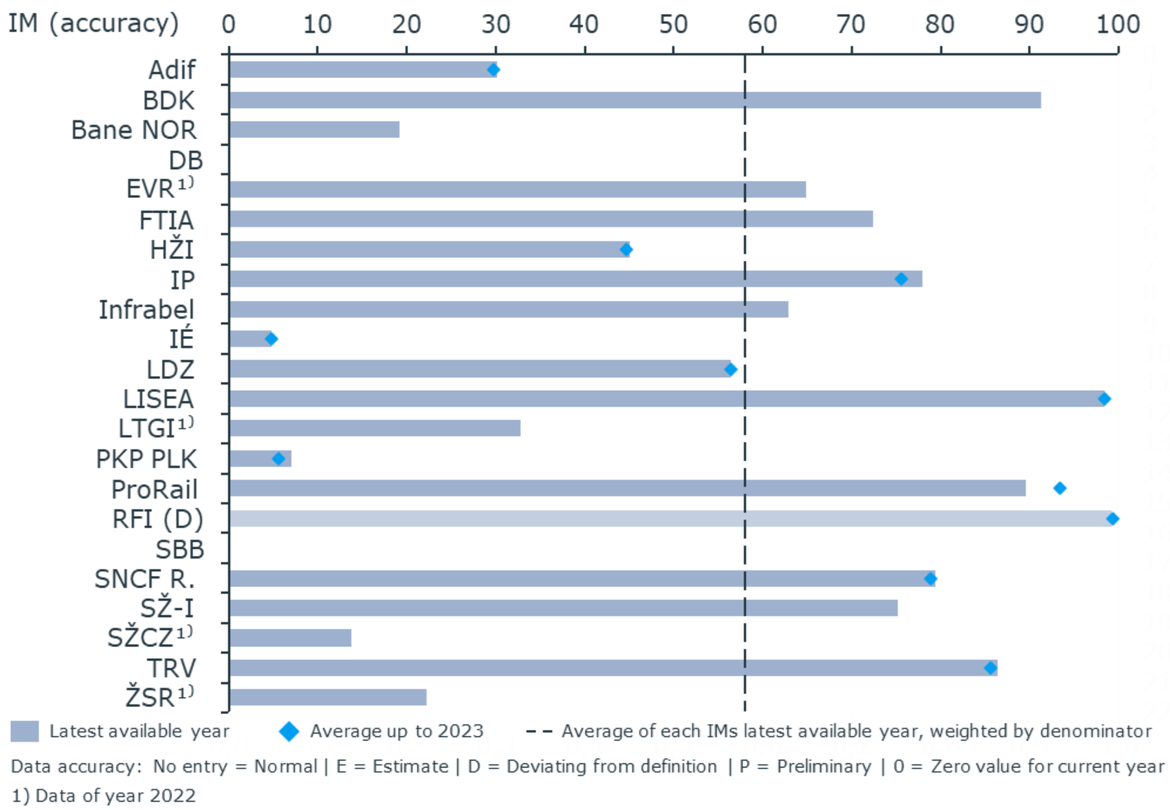

Figure 86: ATP coverage (% of main track-km)

ATP coverage is highly diverse within the peer group. ProRail and RFI have 100% of its network equipped with ATP, while coverage in IÉ and PKP PLK remains below 10%. The peer group average is 58%.

Even though the European vision of the deployment of ERTMS is clearly formulated, the speed and commitment of uptake depend on a variety of factors, including the stage of a railway's development, past and present priorities, funding agreements and the level of the budget for investment. Network size and complexity (number of stations and hubs), adaptability to the existing infrastructure, technical equipment and asset condition are other aspects that might influence the timeline for deployment of ERTMS. Difficulties in coordinating with operators, who must equip their fleet with ERTMS on-board systems, increase the burden of deployment.

4. Annex

4.1 Key influencing factors of participating infrastructure managers

Operating context

Infrastructure managers are operating in different countries under different geographic and political circumstances. Understanding the influencing factors and contextualising the indicators with them is essential for the correct interpretation of the values.

Influencing factors can be grouped in the following seven categories, which are illustrated below. The impacts of these factors on the performance of infrastructure managers are very different: some lead to increasing costs, some have an impact on punctuality or safety.

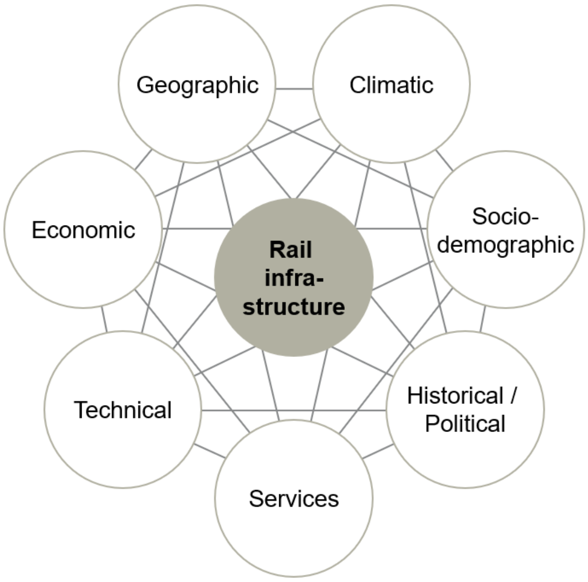

Figure 87: Factors influencing the outcome of rail infrastructure.

Geographic

The geography and topography of a country determines its rail network from the moment of its construction to its maintenance and renewals. The size of the country, its population density and distribution, and the locations of its economic and cultural centres are all influencing factors, above all for the length of the network. The range of sizes of the countries included in this report lies between 20,000 and 633,000 km² for Slovenia and France respectively (overseas territories included). The topography determines the shape and complexity of the network: mountainous regions hinder long, straight lines and generally require more sophisticated rail structures such as bridges and tunnels. The expansion of the network is technically more complex and therefore entails higher investment costs. Furthermore, maintenance costs are higher in mountainous regions as wear and tear is more frequent and repairs are carried out under more difficult conditions. Rail infrastructure in regions of seismic activity is highly exposed to damage caused by earthquakes and seismic waves. Countries with highly complex topographical conditions include Switzerland, Spain, Norway, and Italy.

Climatic

Conditions of climate are also important and have an impact on asset failures, reliability and punctuality that can increase maintenance and renewal costs. In countries with very hard winters such as Scandinavia and the Baltic, very low temperatures might cause broken rails, switch malfunctions, and snowdrifts. Besides normal latitude-related climate conditions, the increasing number of extreme weather events due to climate change has additional impacts. Heavy storms damage tall infrastructure (mileposts, signals), and overturned trees cause delays, failures, and speed restrictions[43]. Increased global temperature is leading to hotter and drier summers, which favour buckling in railway tracks and increase the risk of forest fires.

Socio-demographic

Population size, population density and population distribution within a country shape rail infrastructure. In small countries with a high population density, rail utilisation is higher, allowing for higher economies of scale than in sparsely populated areas. This is visible in the Netherlands with its highly utilised and polycentric urban network. In other countries, for example in Spain and the Scandinavian states, population density varies between densely populated metropolitan areas and the sparsely populated countryside. Age distribution, mobility patterns and environmental awareness of citizens are additional parameters that are influencing the share of rail in the modal split – with possible consequences on funding and extension plans. Beyond national circumstances, international links are also a decisive driver: In transit countries such as Belgium, the Netherlands, Germany, and Switzerland as well as Denmark for freight, transit also accounts for a considerable proportion of network usage. Six of the eleven Rail Freight Corridors run through Germany. In Switzerland, transit traffic has been a major support factor for a railway-friendly policy among the population and politicians.

Political and historical

Even though infrastructure managers are independent entities, output parameters of rail infrastructure, like rail transport volumes, are partly politically influenced and investment decisions heavily depend on the availability and regularity of state funding. The status of rail in a country and the commitment of politicians is therefore very relevant, and historically shaped.

Traditional heavy industry, with heavy and bulky transport goods such as coal, sand, steel, and wood partly explain the high share of rail freight in today’s Eastern European EU Member States.

[43] UIC, 2017: Rail Adapt - Adapting the railway for the future.

Services

The main services offered by railway undertakings on the infrastructure manager's networks are conventional passenger trains over different distances, freight trains and high-speed connections. The different rail services also have an impact on the infrastructure: a high share of freight transport causes higher wear and tear due to the weight of the freight and requires higher maintenance costs. The nature of high-speed train services is not uniform among infrastructure managers. In Germany, for example, high-speed connections mostly run on the same routes as lower speed passenger transport and even freight traffic. If a manager's network consists exclusively of high-speed lines between metropolitan areas, it naturally has other OPEX and CAPEX values and other punctuality and reliability values than a mixed transport network.

Technological

The technical and technological level and state of development of railway network infrastructures varies considerably throughout the EU. When comparing modernisation and roll-out of technological innovations, different starting points, and investment cycles must be considered. The new EU member states mainly started with technological modernisation from the 1990s, getting a bigger boost with the entitlement to EU-funding after their accession. Modern technology helps railways to achieve higher safety performance, minimize their impact on the environment and become more cost efficient. It is therefore in the interest of every infrastructure manager to be equipped with state-of-the-art rail technologies. EU rail policy promotes the incorporation of such technologies to contribute to the achievement of EU rail policy objectives, including facilitating cross-border transport. The introduction of ERTMS is a prominent example.

Economic

Economic circumstances within a country influence the operation of infrastructure managers both directly and indirectly. A country's GDP, its economic power and connectivity all have a positive impact on passenger and freight transport demand[44]. Market structure and the combination of public funding, track access charges and commercial infrastructure funding determines the financing pool available to infrastructure managers.

The amount and continuity of available revenues determines the infrastructure manager's investment possibilities and maintenance performance. In Switzerland for example rail projects are decided for several decades and are independent of politically influenced budgets of a current government. Furthermore, growing state funds and eligibility of European funds (e. g. cohesion fund) are important factors. Czechia for example receives an investment of over EUR 160 million for 2021 from the EU's Cohesion Fund to modernise its rail transport.[45]

[44] Passenger and freight transport demand in the EU: https://www.eea.europa.eu/data-and-maps/indicators/passenger-and-freight-transport-demand/assessment-1

[45] EC: EU Cohesion policy: €160 million to modernise the rail transport in Czechia. https://ec.europa.eu/regional_policy/en/newsroom/news/2021/01/01-11-2021-eu-cohesion-policy-eur160-million-to-modernise-the-rail-transport-in-czechia

4.2 Fact sheets of the infrastructure managers

Other characteristics

- Large areas are sparsely populated
- Complex orography (2nd most mountainous country in Europe)
- High quality road network

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²			506
Border countries	Number		5	
Population	Millions		48	
GDP per capita	%, EU 28=100	88		
Active licenses1)	number	38		
National modal share passenger rail	%		7	
National modal share rail freight	%	4		
International passenger-km1)	%	2		
International tonne-km1)	%	16		
Length of national main lines	km		16.468	
National passenger stations1)	number	1497		
Share of national network managed2)	%			100
Length of high-speed lines	km			3.306
Length of main track	km		21.829	
Full time employees	fte	12.912		
Passenger train-kilometres	m train-km	175		
Freight train-kilometres	m train-km	25		
Total gross tonne-kilometres	bn gtkm		78	
Core maritime ports connection	%		48	
Core inland waterways connection	%			100
Core airports connection	%			

Figure 88: Fact sheet Adif

Other characteristics

- Greatest length of any European country with many fjords
- Two-thirds of Norway is mountainous
- Warm summers and cold, snowy winters

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²		324	
Border countries	Number	3		
Population	Millions	5		
GDP per capita	%, EU 28=100		173	
Active licenses1)	number	13		
National modal share passenger rail	%	5		
National modal share rail freight	%	15		
International passenger-km1)	%	1		
International tonne-km1)	%		33	
Length of national main lines	km	3.907		
National passenger stations1)	number	334		
Share of national network managed2)	%			100
Length of high-speed lines	km	53		
Length of main track	km	4.225		
Full time employees	fte	4.846		
Passenger train-kilometres	m train-km	41		
Freight train-kilometres	m train-km	8		
Total gross tonne-kilometres	bn gtkm	19		
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%			100

Figure 89: Fact sheet: Bane NOR

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	43		
Border countries	Number	1		
Population	Millions	6		
GDP per capita	%, EU 28=100		127	
Active licenses[1]	number	10		
National modal share passenger rail	%		8	
National modal share rail freight	%	10		
International passenger-km[1]	%	8		
International tonne-km[1]	%			95
Length of national main lines	km	2.448		
National passenger stations[1]	number	452		
Share of national network managed[2]	%		80	
Length of high-speed lines	km	57		
Length of main track	km	3.174		
Full time employees	fte	2.927		
Passenger train-kilometres	m train-km	65		
Freight train-kilometres	m train-km	3		
Total gross tonne-kilometres	bn gtkm	17		
Core maritime ports connection	%		50	
Core inland waterways connection	%	0		
Core airports connection	%			100

BANEDANMARK

Other characteristics

- Area and population excludes: Faroe Islands & Greenland
- BDK as an IM is separated from RUs

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Figure 90: Fact sheet: Banedanmark

		Bandwidth of sample		
		Low	Medium	High
Area	k km²		357	
Border countries	Number			9
Population	Millions			83
GDP per capita	%, EU 28=100	115		
Active licenses[1]	number			490
National modal share passenger rail	%		9	
National modal share rail freight	%		20	
International passenger-km[1]	%	8		
International tonne-km[1]	%		56	
Length of national main lines	km			38.836
National passenger stations[1]	number			7109
Share of national network managed[2]	%		85	
Length of high-speed lines	km			2.663
Length of main track	km			55.331
Full time employees	fte			51.290
Passenger train-kilometres	m train-km			827
Freight train-kilometres	m train-km			235
Total gross tonne-kilometres	bn gtkm			
Core maritime ports connection	%			
Core inland waterways connection	%			
Core airports connection	%			

DB InfraGO

Other characteristics

- Data from former DB Netz AG
- Rail network large & No. of RUs very high
- Capacity has reached its limits
- Transit: six out of nine Rail Freight Corridors
- Rail noise – public issue

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Figure 91: Fact sheet: DB InfraGO AG

Other characteristics

- The terrain is flat
- Relative short distances
- Often large amounts of snow in the winter

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Indicator	Unit	Bandwidth of sample: Low	Medium	High
Area	k km²	45		
Border countries	Number	2		
Population	Millions	1		
GDP per capita	%, EU 28=100	81		
Active licenses[1)]	number	15		
National modal share passenger rail	%	2		
National modal share rail freight	%		27	
International passenger-km[1)]	%	1		
International tonne-km[1)]	%			79
Length of national main lines	km	1.175		
National passenger stations[1)]	number	106		
Share of national network managed[2)]	%		85	
Length of high-speed lines	km	0		
Length of main track	km	800		
Full time employees	fte	700		
Passenger train-kilometres	m train-km	5		
Freight train-kilometres	m train-km	1		
Total gross tonne-kilometres	bn gtkm	1		
Core maritime ports connection	%		50	
Core inland waterways connection	%	0		
Core airports connection	%			100

Figure 92: Fact sheet: AS Eesti Raudtee

Finnish Transport Infrastructure Agency

Other characteristics

- The terrain is flat
- Half of the mainland is made up forests
- Often large amounts of snow in the winter

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Indicator	Unit	Bandwidth of sample: Low	Medium	High
Area	k km²		338	
Border countries	Number	3		
Population	Millions	6		
GDP per capita	%, EU 28=100	108		
Active licenses[1)]	number	5		
National modal share passenger rail	%		6	
National modal share rail freight	%		23	
International passenger-km[1)]	%	0		
International tonne-km[1)]	%	17		
Length of national main lines	km	5.918		
National passenger stations[1)]	number	202		
Share of national network managed[2)]	%			100
Length of high-speed lines	km	0		
Length of main track	km	6.731		
Full time employees	fte	469		
Passenger train-kilometres	m train-km	35		
Freight train-kilometres	m train-km	13		
Total gross tonne-kilometres	bn gtkm	28		
Core maritime ports connection	%			
Core inland waterways connection	%			
Core airports connection	%			

Figure 93: Fact sheet: Finish Transport Infrastructure Agency

HŽ INFRASTRUKTURA

Other characteristics

- Intersection of Mediterranean and Alpine – West Balkan corridor
- High amount of single tracks
- 25 kV AC overhead line
- Normal track gauge

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	57		
Border countries	Number		5	
Population	Millions	4		
GDP per capita	%, EU 28=100	76		
Active licenses[1]	number	14		
National modal share passenger rail	%	3		
National modal share rail freight	%		26	
International passenger-km[1]	%		8	
International tonne-km[1]	%			81
Length of national main lines	km	2.617		
National passenger stations[1]	number	535		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	2.709		
Full time employees	fte	4.997		
Passenger train-kilometres	m train-km	14		
Freight train-kilometres	m train-km	7		
Total gross tonne-kilometres	bn gtkm	8		
Core maritime ports connection	%			83
Core inland waterways connection	%		50	
Core airports connection	%	0		

Figure 94: Fact sheet: HŽ Infrastruktura d.o.o.

Iarnród Éireann Irish Rail

Other characteristics

- 1.600 mm broad gauge Railway
- Rail Freight market limited by the size of the country and the relatively short distances travelled

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	70		
Border countries	Number	1		
Population	Millions	5		
GDP per capita	%, EU 28=100			221
Active licenses[1]	number	3		
National modal share passenger rail	%	3		
National modal share rail freight	%	1		
International passenger-km[1]	%	0		
International tonne-km[1]	%	0		
Length of national main lines	km	2.045		
National passenger stations[1]	number			
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	2.165		
Full time employees	fte	1.738		
Passenger train-kilometres	m train-km	17		
Freight train-kilometres	m train-km	0		
Total gross tonne-kilometres	bn gtkm	5		
Core maritime ports connection	%		33	
Core inland waterways connection	%	0		
Core airports connection	%	0		

Figure 95: Fact sheet: Iarnród Éireann – Irish Rail

Other characteristics

- IP manages the Portuguese rail and road infrastructure
- Iberian gauge, 25kV AC overhead line
- Pop.(mainland) 9.7m
- Area (mainland) 89 k

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	92		
Border countries	Number	1		
Population	Millions	10		
GDP per capita	%, EU 28=100	83		
Active licenses[1]	number	5		
National modal share passenger rail	%	4		
National modal share rail freight	%	12		
International passenger-km[1]	%	0		
International tonne-km[1]	%	20		
Length of national main lines	km	2.527		
National passenger stations[1]	number	458		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	3.225		
Full time employees	fte	3.415		
Passenger train-kilometres	m train-km	22		
Freight train-kilometres	m train-km	4		
Total gross tonne-kilometres	bn gtkm	6		
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%	0		

Figure 96: Fact sheet: Infraestruturas de Portugal S.A.

Other characteristics

- High population density
- High speed lines to surrounding European countries
- High degree of electrification

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	31		
Border countries	Number		4	
Population	Millions	12		
GDP per capita	%, EU 28=100	118		
Active licenses[1]	number	9		
National modal share passenger rail	%		8	
National modal share rail freight	%	12		
International passenger-km[1]	%			19
International tonne-km[1]	%		40	
Length of national main lines	km	3.619		
National passenger stations[1]	number	555		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	6.553		
Full time employees	fte	9.955		
Passenger train-kilometres	m train-km	84		
Freight train-kilometres	m train-km	9		
Total gross tonne-kilometres	bn gtkm	41		
Core maritime ports connection	%			75
Core inland waterways connection	%			
Core airports connection	%		50	

Figure 97: Fact sheet: Infrabel

LATVIJAS DZELZCEĻŠ

Other characteristics

- Connections with Baltic sea ports
- Transit between East and West

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample: Low	Medium	High
Area	k km²	65		
Border countries	Number		4	
Population	Millions	2		
GDP per capita	%, EU 28=100	71		
Active licenses[1]	number	6		
National modal share passenger rail	%	4		
National modal share rail freight	%			53
International passenger-km[1]	%	0		
International tonne-km[1]	%			93
Length of national main lines	km	1.831		
National passenger stations[1]	number	138		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	2.217		
Full time employees	fte	2.618		
Passenger train-kilometres	m train-km	6		
Freight train-kilometres	m train-km	3		
Total gross tonne-kilometres	bn gtkm	10		
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%			

Figure 98: Fact sheet: Latvijas dzelzceļš

LTG INFRA

Other characteristics

- Connection between 1435 mm and 1520 mm tracks
- Connection with Klaipėda seaport
- High amount of single tracks

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample: Low	Medium	High
Area	k km²	65		
Border countries	Number		4	
Population	Millions	3		
GDP per capita	%, EU 28=100	86		
Active licenses[1]	number	8		
National modal share passenger rail	%	1		
National modal share rail freight	%			46
International passenger-km[1]	%		12	
International tonne-km[1]	%			53
Length of national main lines	km	1.919		
National passenger stations[1]	number	131		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	2.354		
Full time employees	fte	2.367		
Passenger train-kilometres	m train-km	6		
Freight train-kilometres	m train-km	5		
Total gross tonne-kilometres	bn gtkm	13		
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%			100

Figure 99: Fact sheet: AB LTG Infra

Other characteristics

- Only HSL
- PPP contract
- Touristic destination

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²			633
Border countries	Number			8
Population	Millions			68
GDP per capita	%, EU 28=100	101		
Active licenses[1]	number	34		
National modal share passenger rail	%		11	
National modal share rail freight	%	11		
International passenger-km[1]	%	8		
International tonne-km[1]	%		41	
Length of national main lines	km			27.812
National passenger stations[1]	number		3010	
Share of national network managed[2]	%	2		
Length of high-speed lines	km	665		
Length of main track	km	665		
Full time employees	fte	31		
Passenger train-kilometres	m train-km	6		
Freight train-kilometres	m train-km	0		
Total gross tonne-kilometres	bn gtkm	4		
Core maritime ports connection	%	0		
Core inland waterways connection	%	0		
Core airports connection	%	0		

Figure 100: Fact sheet: LISEA

Other characteristics

- 3rd largest railway network in the EU
- Standard rail gauge
- 6th in the EU in terms of country coverage and population
- 3kV traction voltage

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²		313	
Border countries	Number			7
Population	Millions		37	
GDP per capita	%, EU 28=100	80		
Active licenses[1]	number	126		
National modal share passenger rail	%		8	
National modal share rail freight	%		23	
International passenger-km[1]	%	6		
International tonne-km[1]	%		44	
Length of national main lines	km		19.355	
National passenger stations[1]	number		2800	
Share of national network managed[2]	%			96
Length of high-speed lines	km	248		
Length of main track	km		27.558	
Full time employees	fte			37.258
Passenger train-kilometres	m train-km	189		
Freight train-kilometres	m train-km		81	
Total gross tonne-kilometres	bn gtkm			165
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%		56	

Figure 101: Fact sheet: PKP PLK

ProRail

Other characteristics

- Large increase in passenger demand now and next 10 years to come
- Polycentric urban network with traffic evenly in both directions

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	42		
Border countries	Number	2		
Population	Millions	18		
GDP per capita	%, EU 28=100		130	
Active licenses[1]	number	46		
National modal share passenger rail	%		12	
National modal share rail freight	%	7		
International passenger-km[1]	%	4		
International tonne-km[1]	%			86
Length of national main lines	km	3.041		
National passenger stations[1]	number	398		
Share of national network managed[2]	%			100
Length of high-speed lines	km	72		
Length of main track	km	7.002		
Full time employees	fte	5.173		
Passenger train-kilometres	m train-km	135		
Freight train-kilometres	m train-km	9		
Total gross tonne-kilometres	bn gtkm	51		
Core maritime ports connection	%			100
Core inland waterways connection	%	0		
Core airports connection	%		56	

Figure 102: Fact sheet: ProRail

RFI Rete Ferroviaria Italiana

Other characteristics

- Complex orography (high number of tunnels and bridges); seismic territory (> 40%); hydrogeological risk
- Dichotomy North/South
- ~100% ATP, ~80% SCC
- Five out of nine Ten-T Corridors

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²		301	
Border countries	Number		6	
Population	Millions			59
GDP per capita	%, EU 28=100	97		
Active licenses[1]	number	39		
National modal share passenger rail	%	6		
National modal share rail freight	%	12		
International passenger-km[1]	%	2		
International tonne-km[1]	%		46	
Length of national main lines	km		16.829	
National passenger stations[1]	number	2194		
Share of national network managed[2]	%			92
Length of high-speed lines	km	1.097		
Length of main track	km		26.985	
Full time employees	fte		31.832	
Passenger train-kilometres	m train-km		324	
Freight train-kilometres	m train-km	52		
Total gross tonne-kilometres	bn gtkm			171
Core maritime ports connection	%		64	
Core inland waterways connection	%			100
Core airports connection	%		55	

Figure 103: Fact sheet: RFI

SBB CFF FFS

Other characteristics

- Federal state, strong position of regions
- High purchasing power; almost no heavy industries
- Night driving ban for lorries, no national bus system

1) EC RMMS 2018 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	41		
Border countries	Number		5	
Population	Millions	9		
GDP per capita	%, EU 28=100		154	
Active licenses[1]	number	54		
National modal share passenger rail	%			17
National modal share rail freight	%		34	
International passenger-km[1]	%		11	
International tonne-km[1]	%			76
Length of national main lines	km	5.332		
National passenger stations[1]	number	1.672		
Share of national network managed[2]	%	61		
Length of high-speed lines	km	138		
Length of main track	km	6.413		
Full time employees	fte	10.060		
Passenger train-kilometres	m train-km	161		
Freight train-kilometres	m train-km	27		
Total gross tonne-kilometres	bn gtkm		78	
Core maritime ports connection	%	0		
Core inland waterways connection	%			100
Core airports connection	%			100

Figure 104: Fact sheet: SBB

SNCF RÉSEAU

Other characteristics

- Area (mainland): 543 k km²
- Population (mainland): 66 millions
- Heterogeneous climate
- Urban polarisation
- Highly regulated

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²			633
Border countries	Number			8
Population	Millions			68
GDP per capita	%, EU 28=100	101		
Active licenses[1]	number	34		
National modal share passenger rail	%		11	
National modal share rail freight	%	11		
International passenger-km[1]	%	8		
International tonne-km[1]	%		41	
Length of national main lines	km			26.938
National passenger stations[1]	number		3010	
Share of national network managed[2]	%			98
Length of high-speed lines	km		2.137	
Length of main track	km			47.588
Full time employees	fte			51.660
Passenger train-kilometres	m train-km		378	
Freight train-kilometres	m train-km			
Total gross tonne-kilometres	bn gtkm	55		
Core maritime ports connection	%			88
Core inland waterways connection	%			100
Core airports connection	%		38	

Figure 105: Fact sheet: SNCF Réseau

Other characteristics

- Top density of lines per km² within the EU
- High density of stops, stations and level crossings
- Two gauges
- Four systems of electricity

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Indicator	Unit	Bandwidth of sample: Low	Medium	High
Area	k km²	79		
Border countries	Number		4	
Population	Millions	11		
GDP per capita	%, EU 28=100	91		
Active licenses[1]	number	109		
National modal share passenger rail	%		8	
National modal share rail freight	%		22	
International passenger-km[1]	%		18	
International tonne-km[1]	%			67
Length of national main lines	km	9.521		
National passenger stations[1]	number		2633	
Share of national network managed[2]	%			98
Length of high-speed lines	km	0		
Length of main track	km	11.496		
Full time employees	fte	17.021		
Passenger train-kilometres	m train-km	0		
Freight train-kilometres	m train-km	35		
Total gross tonne-kilometres	bn gtkm		60	
Core maritime ports connection	%	0		
Core inland waterways connection	%			100
Core airports connection	%			100

Figure 106: Správa železnic, státní organizace

Other characteristics

- Central network with only one company operating passenger services
- Intersection of Pan-European corridors V and X

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

Indicator	Unit	Bandwidth of sample: Low	Medium	High
Area	k km²	20		
Border countries	Number		4	
Population	Millions	2		
GDP per capita	%, EU 28=100	91		
Active licenses[1]	number	8		
National modal share passenger rail	%	2		
National modal share rail freight	%		33	
International passenger-km[1]	%			27
International tonne-km[1]	%			99
Length of national main lines	km	1.208		
National passenger stations[1]	number	269		
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	1.534		
Full time employees	fte			
Passenger train-kilometres	m train-km	9		
Freight train-kilometres	m train-km	10		
Total gross tonne-kilometres	bn gtkm	11		
Core maritime ports connection	%			100
Core inland waterways connection	%			
Core airports connection	%	0		

Figure 107: Fact sheet: SŽ-Infrastruktura d.o.o.

TRAFIKVERKET

Other characteristics

- Open market, many railway undertakings
- All tracks open for both passenger and freight traffic
- Large areas are sparsely populated

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²			450
Border countries	Number	2		
Population	Millions	11		
GDP per capita	%, EU 28=100	114		
Active licenses[1]	number	58		
National modal share passenger rail	%		11	
National modal share rail freight	%		29	
International passenger-km[1]	%	4		
International tonne-km[1]	%		38	
Length of national main lines	km	10.914		
National passenger stations[1]	number	683		
Share of national network managed[2]	%			89
Length of high-speed lines	km	0		
Length of main track	km	11.882		
Full time employees	fte	9.617		
Passenger train-kilometres	m train-km	123		
Freight train-kilometres	m train-km	37		
Total gross tonne-kilometres	bn gtkm		72	
Core maritime ports connection	%			100
Core inland waterways connection	%		40	
Core airports connection	%		33	

Figure 108: Fact sheet: Trafikverket

ŽSR

Other characteristics

- Mostly standard, but also some broad gauge tracks
- Increasing number of private RUs

1) EC RMMS 2022 data
2) IRG Rail 2019 data

— Under the line, IM specific data

		Bandwidth of sample		
		Low	Medium	High
Area	k km²	49		
Border countries	Number		5	
Population	Millions	5		
GDP per capita	%, EU 28=100	73		
Active licenses[1]	number	32		
National modal share passenger rail	%		9	
National modal share rail freight	%		30	
International passenger-km[1]	%	9		
International tonne-km[1]	%			83
Length of national main lines	km	3.626		
National passenger stations[1]	number			
Share of national network managed[2]	%			100
Length of high-speed lines	km	0		
Length of main track	km	4.646		
Full time employees	fte	12.707		
Passenger train-kilometres	m train-km	34		
Freight train-kilometres	m train-km	14		
Total gross tonne-kilometres	bn gtkm	26		
Core maritime ports connection	%	0		
Core inland waterways connection	%	0		
Core airports connection	%	0		

Figure 109: Fact sheet: Železnice Slovenskej republiky

4.3 Comments on deviations

Page	Indicator name	Input data name[46]	IM[47]	Comment by the IM for 2023
40	OPEX – operational expenditures in relation to network size	Total OPEX - operating expenditures (N)	DB	without stations
40	OPEX – operational expenditures in relation to network size	Total OPEX - operating expenditures (N)	SŽ-I	without power consumption
44	CAPEX – capital expenditures in relation to network size	Total CAPEX - capital expenditures (N)	DB	without stations
48	Maintenance expenditures in relation to network size	Total maintenance expenditures (N)	DB	without stations
48	Renewal expenditures in relation to network size	Total renewal expenditures (N)	DB	Includes renewals and enhancements, this figure aggregates both
67	Significant accidents	Number of significant accidents (N)	DB	number refers to all IMs in Germany
69	Fatalities and weighted serious injuries	Number of persons seriously injured (N)	DB	number refers to all IMs in Germany
69	Fatalities and weighted serious injuries	Number of persons killed (N)	DB	number refers to all IMs in Germany
71	IM related precursors to accidents	Number of precursors to accidents (N)	DB	number refers to all IMs in Germany
82	Share of renewable traction energy	Share of renewable traction energy (N)	HŽI	Share of energy from renewable sources in Croatia in 2022
83	Share of renewable energy excluding traction	Share of renewable energy excluding traction (N)	HŽI	Share of energy from renewable sources in Croatia in 2022
84	CO2 emission produced from IM's own maintenance rolling stock	CO2e emission produced from maintenance rolling stock	BDK	Defined as the amount of CO2 that is emitted from the consumption of petrol and diesel from Banedanmark's trolleys and other work vehicles.
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	Adif	Only HS and Medium range trains. Commuter and regional thresholds are 3' and 1' in Spain.
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	DB	Definition: Passenger trains: 0,00 to max. 5,59 minutes

[46] The letters "D" and "N" mark the denominator (D) and nominator (N) of the indicator.
[47] IM = Infrastructure manager

Page	Indicator name	Input data name[46]	IM[47]	Comment by the IM for 2023
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	LISEA	less than 05:59
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	RFI	The measuring point is the arrival time of the train
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	SNCF. R	Punctuality refers to an arrival with a delay of less or equal 5:00 minutes
89	Passenger trains punctuality	Passenger trains arrived at strategic measuring points with a delay of less than or equal to 5:29 minutes (N)	ŽSR	Punctuality refers to an arrival with a delay of less or equal 5:00 minutes
89	Passenger trains punctuality	Number of scheduled passenger trains that operated (D)	Adif	Only HS and Medium range trains. Commuter and regional thresholds are 3' and 1' in Spain.
92	Freight trains punctuality	Freight trains arrived at strategic measuring points with a delay of less than or equal to 15:29 minutes (N)	DB	Definition: Passenger trains: 0:00 to max. 15:59 minutes
92	Freight trains punctuality	Freight trains arrived at strategic measuring points with a delay of less than or equal to 15:29 minutes (N)	RFI	The measuring point is the arrival time of the train
92	Freight trains punctuality	Number of scheduled freight trains that operated (D)	HŽI	ad hoc freight trains are not included in punctuality
92	Freight trains punctuality	Number of scheduled freight trains that operated (D)	SNCF. R	Punctuality refers to an arrival with a delay of less or equal 15:59 minutes
92	Freight trains punctuality	Freight trains arrived at strategic measuring points with a delay of less than or equal to 15:29 minutes (N)	ŽSR	Punctuality refers to an arrival with a delay of less or equal 15:00 minutes

Page	Indicator name	Input data name[46]	IM[47]	Comment by the IM for 2023
94	Delay minutes per train caused by the IM	Delay minutes - IM's responsibility (N)	LISEA	less than 05:59
100	Average delay minutes per asset failure	Total delay minutes - Asset failures (N)	LISEA	less than 05:59
107	Planned extent of ERTMS deployment by 2030	In 2030 sum of main track-km planned deployed with ERTMS (N)	TRV	The national roll-out plan is currently under revision and the figures will probably be updated shortly. Reported figures are those before the revision started
109	ATP coverage	Main track-km equipped with ATP (N)	RFI	Main track-km estimate is based on line-km equipped with ATP

4.4 PRIME KPI-definitions

More detailed explanation on the definitions of input data and the indicators can be found in the catalogue available on the PRIME website.

Overview of main rail industry characteristics and trends

KPI name	KPI definition	KPI unit
National modal share of rail in passenger transport	Proportion of national rail passenger-km compared to total passenger-km of passenger cars, buses/coaches, and railways. (Source: European Commission, Eurostat)	% of passenger-km
National modal share of rail in freight transport	Proportion of national rail tonne-km compared to total tonne-km of road, inland waterways, and rail freight. (Source: European Commission, Eurostat)	% of tonne-km
Total track-km	Total track-km	km
Total main track-km	A track providing end-to-end line continuity designed for trains between stations or places indicated in tariffs as independent points of departure or arrival for the conveyance of passengers or goods, maintained and operated by the infrastructure manager. Tracks at service facilities not used for running trains are excluded. The boundary of the service facility is the point at which the railway vehicle leaving the service facility cannot pass without having an authorisation to access the mainline or other similar line. This point is usually identified by a signal. Service facilities are passenger stations, their buildings, and other facilities; freight terminals; marshalling yards and train formation facilities, including shunting facilities; storage sidings; maintenance facilities; other technical facilities, including cleaning and washing facilities; maritime and inland port facilities which are linked to rail activities; relief facilities; refuelling facilities and supply of fuel in these facilities.	km
Total main line-km	Cumulative length of railway lines operated and used for running trains by the end of reporting year	km

KPI name	KPI definition	KPI unit
	Lines solely used for operating touristic trains and heritage trains are excluded, as are railways constructed solely to serve mines, forests or other industrial or agricultural installations and which are not open to public traffic. Metro, Tram, and Light rail urban lines (with non-standard – narrow - gauge) should be excluded. Private lines closed to public traffic and functionally separated (i.e. stand-alone) networks should be excluded. Private lines used for own freight transport activities or for non-commercial passenger services and light rail lines occasionally used by heavy rail vehicles for connectivity or transit purposes are excluded.	
High-speed main line	High-speed main line-km	km
Proportion of high-speed main track-km ≥ 250 km/h)	Percentage of high-speed main track kilometres (≥ 250 km/h) of total main track kilometres	% of main track-km
Proportion of high-speed main track-km (≥ 200 km/h and <250 km/h)	Percentage of high-speed main track kilometres (≥ 200 km/h and <250 km/h) of total main track kilometres	% of main track-km
Degree of network utilisation – passenger trains	Average daily passenger train-km on main track (revenue service only, no shunting, no work trains) related to main track-km	Daily passenger train–km per main track-km
Degree of network utilisation – freight trains	Average daily freight train-km on main track (revenue service only, no shunting, no work trains) related to main track-km	Daily freight train–km per main track-km
Total passenger high-speed train-km	Total high-speed train-km (revenue service only, no shunting, no work trains), ≥ 200 km/h. The basis for consideration is the	Train-km

KPI name	KPI definition	KPI unit
	potential speed of the train, not the actual speed.	

Finance

KPI name	KPI definition	KPI unit
OPEX – operational expenditures in relation to network size	Total IM's annual operational expenditures (net values, excluding value added tax) per main track-km	Euro per main track-km
CAPEX – capital expenditures in relation to network size	Total IM's annual operational expenditures (net values, excluding value added tax) per main track-km	Euro per main track-km
Maintenance expenditures in relation to network size	Total infrastructure managers annual maintenance expenditures (net values, excluding value added tax) per main track-km	Euro per main track-km
Renewal expenditures in relation to network size	Total infrastructure managers annual renewal expenditures (net values, excluding value added tax) per main track-km	Euro per main track-km
TAC revenue in relation to network size	Total infrastructure manager's annual TAC revenues (including freight, passenger, and touristic trains) per total main track-km	Euro per main track-km
TAC revenue in relation to traffic volume	Total infrastructure manager's annual TAC revenues (including freight, passenger, and touristic trains) per train-km	Euro per total train-km
Total revenues from non-access charges in relation to network size	Total infrastructure managers annual revenues from non-access charges (e.g. commercial letting, advertising, telecoms, but excluding grants or subsidies) related to total main track-km	Euro per main track-km
Proportion of TAC in total revenue	Percentage of infrastructure managers annual TAC revenues (including freight, passenger, and touristic trains) compared to total revenues	% of monetary value

KPI name	KPI definition	KPI unit
Maintenance and renewal	Total IMs annual renewal and maintenance expenditures (sum of total IMs annual renewal expenditures and total IMs annual maintenance expenditures) in relation to network size	Euro per main track-km
Total public funding	Total public funding related to network size	Euro per main track-km
Public funding for OPEX	Total public funding for OPEX related to network size	Euro per main track-km
Public funding for CAPEX	Total public funding for CAPEX related to network size	Euro per main track-km

Safety

KPI name	KPI definition	KPI unit
Significant accidents	Relative number of significant accidents including sidings, excluding accidents in workshops, warehouses, and depots, based on the following types of accidents (primary accidents): • Collision of train with rail vehicle, • Collision of train with obstacle within the clearance gauge, • Derailment of train, • Level crossing accident, including accident involving pedestrians at level crossing, • Accident to persons involving rolling stock in motion, except for suicides and attempted suicides, • Fire on rolling stock, • Other accidents The boundary is the point at which the railway vehicle leaving the workshop / warehouse / depot / sidings cannot pass without having an authorisation to access the mainline or other similar line. This point is usually identified by a signal. For further	Number per million train-km

KPI name	KPI definition	KPI unit
	guidance, please see ERA Implementation Guidance on CSIs.	
Fatalities and weighted serious injuries	Sum of the number of persons killed (i.e. killed immediately or dying within 30 days, excluding any suicide) and of the weighted number of persons seriously injured (i.e. hospitalised for more than 24 hours, excluding any attempted suicide) by accidents based upon following categories: • Passenger • Employee or contractor • Level crossing user • Trespasser • Other person at a platform • Other person not at a platform A person seriously injured is considered statistically equivalent to 0.1 person killed.	In number per million train-km
Infrastructure manager related precursor to accidents	Relative number of the following types of precursors: • broken rail, • track buckle and track misalignment, • wrong-side signalling failure	In number per million train-km

Environment

KPI name	KPI definition	KPI unit
Degree of electrification of total main track	Percentage of main track-km which are electrified	% of main track-km
Share of electricity-powered trains	Train-kilometres of electricity-powered trains compared to total train-kilometres (both for passenger and freight trains)	% of train-km
Share of diesel-powered trains	Train-kilometres of diesel-powered trains compared to total train-kilometres (both for passenger and freight trains)	% of train-km

KPI name	KPI definition	KPI unit
Share of renewable traction energy	Share of renewable electric traction energy of total traction energy in % of kWh. Renewable energy is an energy that is derived from natural processes that are replenished constantly, such as energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, solid biomass, biogas, and liquid biofuels. Only electric energy is included.	% of kWh
Share of renewable energies (excl. traction)	Share of renewable energies in total consumption excluding traction current. Renewable energy is an energy that is derived from natural processes that are replenished constantly, such as energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, solid biomass, biogas, and liquid biofuels. Does not only concern electric but also other energy such as heating of buildings, fuel, and oil for cars et. al.	% of kWh
CO_2 emission produced from maintenance rolling stock	Tonnes of carbon dioxide emission produced from the activity of maintenance rolling stock compared to main track-km	tCO_2 per main track-km

Performance and delivery

KPI name	KPI definition	KPI unit
Passenger trains punctuality	Percentage of operating (i.e. not cancelled) national and international passenger trains (excluding work trains) which arrive at each strategic measuring point with a delay of less than or equal to 5:29 minutes	% of operating trains
Freight trains punctuality	Percentage of operating (i.e. not cancelled) national and international freight trains (excluding work trains) which arrive at each strategic measuring point with a delay of less than or equal to 15:29 minutes	% of operating trains
Delay minutes per train-km caused by the	Delay minutes caused by incidents that are regarded as infrastructure managers responsibility divided by total train-km operated (revenue service + shunting	Minutes per operating train

KPI name	KPI definition	KPI unit
infrastructure manager	operations to and from depots + infrastructure manager's work traffic). Delay minutes according to UIC leaflet 450-2. Delay minutes will be measured at all available measuring points. Of those measured delay minutes that exceed a threshold of 5:29 minutes for passenger services and 15:29 minutes for freight services the maximum number is counted. No delay minutes are counted if these thresholds are not exceeded at any measuring point.	
Assets failures in relation to network size	Average number of all asset failures on main track according to UIC leaflet 450-2. An asset failure is counted one time and one time only if any train is affected by it. A train is affected if the asset failure causes the train to exceed a delay minutes threshold of 5:29 minutes for passenger services or 15:29 minutes for freight services at any available measuring point. An asset failure is not counted if these thresholds are not exceeded for any train at any available measuring point (i.e. if no train is affected).	Number per thousand main track-km
Average delay minutes per asset failure	Average delay minutes per asset failure caused by all asset failures on main track according to UIC leaflet 450-2. An asset failure is counted one time and one time only if any train is affected by it. A train is affected if the asset failure causes the train to exceed a delay minutes threshold of 5:29 minutes for passenger services or 15:29 minutes for freight services at any available measuring point. Delay minutes will be measured at all available measuring points. Of those measured delay minutes, the maximum number is counted. No delay minutes are counted if these thresholds are not exceeded at any measuring point. An asset failure is not counted if these thresholds are not exceeded for any train at any available measuring point (i.e. if no train is affected).	Minutes per failure

Availability

KPI name	KPI definition	KPI unit
Tracks with permanent speed restrictions	Percentage of tracks with permanent speed restriction due to deteriorating asset condition weighted by the time the restrictions are in place (included in the yearly timetable) related to total main track-km; restrictions are counted whenever criterion is met regardless of whether infrastructure manager reports permanent speed restrictions as such or if they are included in the timetable.	% of main track-km
Tracks with temporary speed restrictions	Percentage of tracks with temporary speed restriction due to deteriorating asset condition weighted by the time the restrictions are in place (not included in the yearly timetable) related to total main track-km.	% of main track-km

ERTMS deployment and intermodality

KPI name	KPI definition	KPI unit
ERTMS trackside deployment	Main tracks with ERTMS in operation in proportion to total main tracks (measured in track-km).	% of main track-km
Planned extent of ERTMS deployment by 2030	In 2030, the percentage of main track-km planned to have been deployed with ERTMS, i.e. main tracks equipped with both - ETCS (European train control system; any baseline or level) and GSM-R (Global System for Mobile Communications); and where ETCS and GSM-R are used in service.	% of current main track-km
ATP coverage	Share of main track-km equipped with ATP. ATP is a train protection system providing warning and automatic stop, and continuous supervision of speed, protection of danger points and continuous supervision of the speed limits of the line, where "continuous supervision of speed" means continuous indication and enforcement of the maximal allowed target speed on all sections of the line. Including e.g. ETCS, ATB, LZB, CBTC and similar systems.	% of main track-km

KPI name	KPI definition	KPI unit
Core maritime ports connection	Percentage of core maritime ports linked to the TEN-T network connected	% of core maritime ports
Core inland waterways connection	Percentage of core inland waterways linked to the TEN-T network	% of core inland waterways
Core airports connection	Percentage of core airports linked to the TEN-T network	% of core airports

4.5 Individual thresholds of punctuality for national measures

Passenger train categories	2:59	3:54	3:59	4:59	5:00	5:29	5:59
Long distance	SBB CFF FFS, Banedanmark, ProRail	Infrastruktura		Adif, Infraestruturas de Portugal	ZSR	PLK, RFI	LTG Infra, SNCF Réseau, DB InfraGO, Latvijas Dzelzceļš, Trafikverket, Bane NOR
Regional	SBB CFF FFS, Banedanmark, ProRail	Infrastruktura	Bane NOR	Adif, Infraestruturas de Portugal	ZSR	RFI, PLK	LTG Infra, SNCF Réseau, DB InfraGO, Latvijas Dzelzceļš, Trafikverket
Commuter	SBB CFF FFS, Banedanmark, Adif, ProRail	Infrastruktura	Bane NOR	Infraestruturas de Portugal		RFI, PLK	LTG Infra, SNCF Réseau, DB InfraGO, Latvijas Dzelzceļš, Trafikverket

Figure 110: National delay measurement thresholds (in minutes:seconds) [48]

	2:59	4:59	5:59	14:59	15:29	15:59	29:59	30:29	59:59	95:00
Freight trains	ProRail	Banedanmark	Trafikverket, Bane NOR	LTG Infra	PLK	DB InfraGO, Latvijas Dzelzceļš	SNCF Réseau, Infraestruturas de Portugal	RFI	Adif	Infrastruktura

Figure 111: National delay measurement thresholds (in minutes:seconds)

[48] RFI threshold for long distance trains is threshold for IM punctuality. Long-distance trains of dome other IMs have a threshold of 15:29.

4.6 Financial data

	Purchasing power parity				
Country	2019	2020	2021	2022	2023
Belgium	1,17	1,16	1,17	1,20	1,20
Croatia	0,66	0,66	0,65	0,69	0,71
Czechia	17,78	18,33	19,20	20,29	20,20
Denmark	10,72	10,67	10,53	10,92	10,75
Estonia	0,82	0,82	0,87	0,94	0,97
Finland	1,28	1,28	1,29	1,29	1,28
France	1,10	1,09	1,10	1,10	1,09
Germany	1,08	1,08	1,08	1,09	1,09
Ireland	1,39	1,45	1,42	1,42	1,41
Italy	1,03	1,03	1,02	1,01	0,98
Latvia	0,74	0,74	0,72	0,77	0,77
Lithuania	0,64	0,66	0,68	0,75	0,78
Netherlands	1,21	1,21	1,21	1,19	1,21
Norway	15,27	15,65	15,50	15,51	15,35
Poland	2,45	2,48	2,59	2,77	2,97
Portugal	0,87	0,88	0,86	0,85	0,85
Slovakia	0,79	0,77	0,76	0,80	0,80
Slovenia	0,86	0,86	0,87	0,88	0,90
Spain	0,96	0,99	0,95	0,93	0,91
Sweden	13,89	14,04	13,88	13,86	14,03
Switzerland	1,95	1,95	1,90	1,83	1,79

Figure 112: Purchasing power parity (Index, EU-27=1) [49]

[49] Source: Eurostat, Actual individual Consumption, status 01.2025. Please note that the PPP values for 2021 and 2022 are preliminary and may be revised in the next data release periods of Eurostat.

5. Glossary

Name	Description	Source
Affected train (by an asset failure)	A train is affected if the asset failure causes the train to exceed a delay minutes threshold of 5:29 minutes for passenger services or 15:29 minutes for freight services at any available measuring point.	
Ancillary services	Ancillary services may comprise: (a) access to telecommunication networks; (b) provision of supplementary information; (c) technical inspection of rolling stock; (d) ticketing services in passenger stations; (e) heavy maintenance services supplied in maintenance facilities dedicated to high-speed trains or to other types of rolling stock requiring specific facilities.	Directive 2012/34/EU Annex II)
Asset Capability	Asset capability is a quality or function as a property or natural part of an asset. A capability is a characteristic of an asset enabling achievement of its desired function.	
Asset failure	An asset failure is counted one time and one time only if any train is affected by it. A train is affected if the asset failure causes the train to exceed a delay minutes threshold of 5:29 minutes for passenger services or 15:29 minutes for freight services at any available measuring point. An asset failure is not counted if these thresholds are not exceeded for any train at any available measuring point (i.e. if no train is affected).	
Asset Management	Coordinated activity of an organisation to realise value from assets.	ISO 55000:2014

Name	Description	Source
Assets	LICB defines the Railway Infrastructures as consisting of the following items, assuming they form part the permanent way, including sidings, but excluding lines situated within railway repair workshops, depots or locomotive sheds and private branch lines or sidings: Ground area Track and track bed etc. Engineering structures: Bridges culverts and other overpasses, tunnels etc. Level crossings, including appliances to ensure safety of road traffic; Superstructure, in particular: rails, grooved rails; sleepers, small fittings for the permanent way, ballast, points, crossings. Access way for passengers and goods, including access by road; Safety, signalling and telecommunications installations on the open track, in stations and in marshalling yards etc. Lightning installations for traffic and safety purposes Plant for transforming and carrying electric power for train haulage: substations, Supply cables between sub-stations and contact wires, catenaries.	EC Directives, European Commission 5th Framework Programme Improve rail, Deliverable D3, "Benchmarking exercise in railway infrastructure management" as referred in the UIC Lasting Infrastructure Cost Benchmarking (LICB) project.
ATP (Automatic train protection)	ATP is a train protection system providing warning and automatic stop and continuous supervision of speed, protection of danger points and continuous supervision of the speed limits of the line, where "continuous supervision of speed" means continuous indication and enforcement of the maximal allowed target speed on all sections of the line.	

Name	Description	Source
Bottleneck	A physical, technical, or functional barrier which leads to a system break affecting the continuity of long-distance or cross-border flows and which can be surmounted by creating new infrastructure or substantially upgrading existing infrastructure that could bring significant improvements which will solve the bottleneck constraints.	Regulation (EU) No 1315/2013 (TEN-T), Article (3)(q)
Broken rail	Any rail which is separated in two or more pieces, or any rail from which a piece of metal becomes detached, causing a gap of more than 50 mm in length and more than 10 mm in depth on the running surface.	Directive (EU) 2016/798 on railway safety, Annex I, Appendix 4.1
Cancelled train	If a planned service is not running (i.e. train cancelled in the operations phase). The codes described in UIC CODE, 450 – 2, OR, 5th edition, June 2009, Appendix A page 9 should be used to describe the cause of cancellation overall or just a part of the route. Cancelled trains can be split into four types. These are: •full cancellation (cancelled at origin) •part cancellation en route •part cancellation changed origin •part cancellation diverted (any train that diverts and does not stop at all its scheduled locations will be classed as a part cancellation even if it reaches its end destination).	UIC CODE, 450 – 2, OR, 5th edition, June 2009, 6 – Cancelled services, combined with adopting the types of cancellations described by Network Rail.
Capacity (infrastructure)	Capacity means the potential to schedule train paths requested for an element of infrastructure for a certain period.	2012/34/EU (SERA), Article 3 (24)

Name	Description	Source
CAPEX, Capital expenditures	Capital expenditures are funds used by a company to acquire or upgrade physical assets such as property, industrial buildings, or equipment. An expense is a capital expenditure when the asset is a newly purchased capital asset or an investment that improves the useful life of an existing capital asset. Hence, it comprises investments in new infrastructure as well as renewals and enhancements.	PRIME KPI subgroup
Charges for service facilities	Revenues generated by providing access to service facilities. Services facilities include: (a) passenger stations, their buildings, and other facilities, including travel information display and suitable location for ticketing services (b) freight terminals (c) marshalling yards and train formation facilities, including shunting facilities (d) storage sidings (e) maintenance facilities, except for heavy maintenance facilities dedicated to high-speed trains or to other types of rolling stock requiring specific facilities (f) other technical facilities, including cleaning and washing facilities (g) maritime and inland port facilities which are linked to rail activities (h) relief facilities (i) refuelling facilities and supply of fuel in these facilities, charges for which shall be shown on the invoices separately	Directive 2012/32/EU, Annex II
Conventional train	Train, composed of vehicles designed to operate at speeds below 250 km/h.	Decision No. 1692/96/EC (TEN-T), Art.10(1)
Delay	The time difference between the time the train was scheduled to arrive in accordance with the published timetable and the time of its actual arrival.	Adapted from ERA, Glossary of railway terminology

Name	Description	Source
Delay minutes	Delay minutes will be measured at all available measuring points. Of those measured delay minutes that exceed a threshold of 5:29 minutes for passenger services and 15:29 minutes for freight services the maximum number is counted. No delay minutes are counted if these thresholds are not exceeded at any measuring point.	
Deployment	The deployment of a mechanical device, electrical system, computer program, etc., is its assembly or transformation from a packaged form to an operational working state. Deployment implies moving a product from a temporary or development state to a permanent or desired state.	
Derailment of train	Any case in which at least one wheel of a train leaves the rails.	Glossary for Transport Statistics, A.VI-14 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.7

Name	Description	Source
Direct Cost in the meaning of Regulation (EU)2015/909	Direct cost in this context means “the cost that is directly incurred as a result of operating the train service” and which is used for setting charges for the minimum access package and for access to infrastructure connecting service facilities. The modalities for the calculation of the cost that is directly incurred because of operating the train are set out in Commission Implementing Regulation (EU) 2015/909 and can in principle be established based on: (a) a network-wide approach as the difference between, on the one hand, the costs for providing the services of the minimum access package and for the access to the infrastructure connecting service facilities and, on the other hand, the non-eligible costs referred to in Article 4 of this regulation, or (b) econometric or engineering cost modelling.	PRIME KPI subgroup based on Implementing Regulation (EU) 2015/909

Name	Description	Source
Expenditure on enhancements of existing infrastructure	Enhancements (or 'upgrades') means capital expenditures on a major modification work of the existing infrastructure which improves its overall performance. Enhancements can be triggered by changed functional requirements (and not triggered by lifetime) or "forced" investments when acting on regulations. The purpose of enhancements is to change the functional requirements such as electrification of a non-electrified line, building a second track parallel to a single tracked line, increase of line speed or capacity. Enhancements include planning (incl. portfolio prioritisation, i.e. which enhancements projects are realized when and where), tendering dismantling (disposal of old equipment), construction, testing and commissioning (when track is opened to full-speed operation). Enhancements are generally looked on at the level of annual spending from a cash-flow perspective, i.e. no depreciation or other imputed costs are considered. It includes its proportion of overhead (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material, (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and contractors (entrepreneurial production) as well as investment subsidies.	PRIME KPI subgroup based on Regulation (EU) 2015/1100 (RMMS), Article 2
ERA	European Union Agency for Railways	Regulation (EU) 2016/796 (ERA)

Name	Description	Source
ERTMS	'European Rail Traffic Management System' (ERTMS) means the system defined in Commission Decision 2006/679/EC and Commission Decision 2006/860/EC European Rail Traffic Management System (ERTMS) is the European signalling system consisting the European Train Control System (ETCS), a standard for in-cab train control, and GSM-R, the GSM mobile communications standard for railway operations. ERTMS in operations refers to main tracks equipped with both - ETCS (European train control system; any baseline or level) and GSM-R (Global System for Mobile Communications); and where ETCS and GSM-R are used in service.	Commission Decision 2006/679/EC Commission Decision 2006/860/EC
Failure	Termination of an item to perform a given service. Also see -> Asset failure	SIS-EN 13306:2010
Financial expenditures	Financial expenditures are the ones accounted for in the annual profit and loss statement. It includes interests and similar charges which correspond to the remuneration of certain financial assets (deposits, bills, bonds, and credits).	PRIME KPI subgroup based on Eurostat concepts and definitions on financial surplus
Freight train	Freight (good) train: train for the carriage of goods composed of one or more wagons and, possibly, vans moving either empty or under load.	Glossary for Transport Statistics, A.IV-06
Freight train-km	Unit of measurement representing the movement of all freight trains over one kilometre. From an infrastructure manager's point of view, it is important to include all freight train movements as they all influence the deterioration of the rail infrastructure assets. Empty freight train movements are therefore included in the number of freight train movements.	Glossary for Transport Statistics, A.IV-07 LICB Web Glossary, p.19

Name	Description	Source
Funding	An amount of money used for a specific purpose, in our case to finance the infrastructure manager expenditures.	Longman, Dictionary of contemporary English
Grant	A direct financial contribution given by the federal, state, or local government or provided from EU funds to an eligible grantee. Grants are not expected to be repaid and do not include financial assistance, such as a loan or loan guarantee, an interest rate subsidy, direct appropriation, or revenue sharing.	PRIME KPI subgroup
Gross tonne km	Unit of measure representing the movement over one kilometre of one tonne of rail vehicle including the weight of tractive vehicle.	Glossary for Transport Statistics, A.IV-14
High-speed train	Train, composed of vehicles designed to operate: - either at speeds of at least 250 km/h on lines specially built for high speeds, while enabling operation at speeds exceeding 300 km/h in appropriate circumstances, - or at speeds of the order of 200 km/h on the lines, where compatible with the performance levels of these lines.	Glossary for Transport Statistics, A.I-02 Directive (EU) 2016/797 on the rail interoperability, Annex I, Article 1

Name	Description	Source
High-speed track	Track (line) whole or part of line, approved for V_{max} ≥ 250 km/h — specially built high-speed lines equipped for speeds generally equal to or greater than 250 km/h, *— specially upgraded high-speed lines equipped for speeds of the order of 200 km/h,* *— specially upgraded high-speed lines which have special features because of topographical, relief or town-planning constraints, on which the speed must be adapted to each case* *The last category also includes interconnecting lines between the high-speed and conventional networks, lines through stations, accesses to terminals, depots, etc. travelled at conventional speed by 'high-speed' rolling stock.* PRIME data collection is conducted separately for high-speed track ≥ 250 & high-speed track ≥ 200 and <250	Glossary for Transport Statistics, A.I-04 Directive (EU) 2016/797 on the rail interoperability, Annex I, Article 1
Infrastructure Manager (IM)	Any firm or body responsible for establishing, managing, and maintaining railway infrastructure, including traffic management and control-command and signalling. An infrastructure manager can delegate to another enterprise the following tasks: maintaining railway infrastructure and operating the control and safety system. 'Infrastructure manager' means any body or firm responsible for establishing, managing, and maintaining railway infrastructure, including traffic management and control-command and signalling; the functions of the infrastructure manager on a network or part of a network may be allocated to different bodies or firms.	Glossary for Transport Statistics. A.III-03 Directive 2012/34/EU (SERA), Article 3(2)
Infrastructure Manager's responsibility for delay minutes	Table, column 1-, 2-, 3- (Operational and planning management, Infrastructure installations, Civil Engineering causes). Plus: Delay minutes caused by weather incidents that have affected the railway infrastructure. The relevant causes are described in Appendix 2.	UIC CODE, 450 – 2, OR, 5th edition, June 2009, Appendix A

Name	Description	Source
Interoperability	The ability of a rail system to allow the safe and uninterrupted movement of trains which accomplish the required levels of performance.	Directive (EU) 2016/797 on the rail interoperability, Article 2(2)
Investments in new infrastructure	Investment in new infrastructure means capital expenditures on the projects for construction of new infrastructure installations for new lines. It includes planning (incl. portfolio prioritisation, i.e. which investment projects are realized when and where), tendering dismantling (disposal of old equipment), construction, testing and commissioning (when track is opened to full-speed operation). Investments are generally looked on at the level of annual spending from a cash-flow perspective, i.e. no depreciation or other imputed costs are considered. It also includes its proportion of overheads (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material, (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and contractors (entrepreneurial production) as well as investment subsidies.	PRIME KPI subgroup based on Regulation (EU) 2015/1100 (RMMS), Article 2
Killed (Death, killed person)	Any person killed immediately or dying within 30 days because of an accident, excluding any suicide.	Glossary for Transport Statistics, A.VI-09 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.18

Name	Description	Source
Level crossing	Any level intersection between a road or passage and a railway, as recognised by the infrastructure manager and open to public or private users. Passages between platforms within stations are excluded, as well as passages over tracks for the sole use of employees.	Glossary for Transport Statistics, A. I-14 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 6.3
Level crossing accident	Any accident at level crossings involving at least one railway vehicle and one or more crossing vehicles, other crossing users such as pedestrians or other objects temporarily present on or near the track if lost by a crossing vehicle or user.	Glossary for Transport Statistics, A. I-15 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.8
Line-km	A cumulative length of all lines maintained by infrastructure managers.	PRIME KPI subgroup based on Glossary for transport statistics
Main Lines (Principle railway lines)	Railway lines maintained and operated for running trains.	Glossary for transport statistics, A.I-02.1

Name	Description	Source
Main lines (Principle railway lines), length of	Cumulative length of railway lines operated and used for running trains by the end of reporting year. Excluded are: - Lines solely used for operating touristic trains and heritage trains - Lines constructed solely to serve mines, forests or other industrial or agricultural installations and which are not open to public traffic - Private lines closed to public traffic and functionally separated (i.e. stand-alone) networks - Private lines used for own freight transport activities or for non-commercial passenger services and light rail tracks occasionally used by heavy rail vehicles for connectivity or transit purposes.	Glossary for transport statistics, A.I-02.1 and A.I-01
Maintenance cost	Costs of function: Maintenance means non-capital expenditures that the infrastructure manager carries out to maintain the condition and capability of the existing infrastructure or to optimise asset lifetimes. Preventive maintenance activities cover inspections, measuring or failure prevention. Corrective maintenance activities are repairs (but not replacement), routine over-hauls or small-scale replacement work excluded from the definitions of renewals. It forms part of annual operating costs. Maintenance expenditures relate to activities that counter the wear, degradation, or ageing of the existing infrastructure so that the required standard of performance is achieved. Types of costs: Maintenance cost include planning, its proportion of overhead (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material, (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and contractors (entrepreneurial production).	PRIME KPI subgroup based on LICB and Regulation (EU) 2015/1100 (RMMS), Article 2

Name	Description	Source
Main track	A track providing end-to-end line continuity designed for running trains between stations or places indicated in timetables, network statements, rosters or other indications/publications as independent points of departure or arrival for the conveyance of passengers or goods.	Glossary for Transport Statistics, A.I-01.1
Main track (main track km), length of	A cumulative length of all running/main tracks Excluded are: - Lines solely used for operating touristic trains and heritage trains - Lines constructed solely to serve mines, forests or other industrial or agricultural installations and which are not open to public traffic - Private lines closed to public traffic and functionally separated (i.e. stand-alone) networks - Private lines used for own freight transport activities or for non-commercial passenger services and light rail tracks occasionally used by heavy rail vehicles for connectivity or transit purposes	Glossary for Transport Statistics, A.I-02.1 and A.I.01
Main track, electrified	Main running tracks provided with an overhead catenary or with conductor rail (3rd rail) to permit electric traction.	Glossary for transport statistics, A.I-01.1 and A.I.15 LICB Web Glossary, p.16

Name	Description	Source
Minimum access package charges	Revenues generated by charging railway undertakings for enabling them to provide their services. The minimum access package comprises: (a) handling of requests for railway infrastructure capacity (b) the right to utilise capacity which is granted (c) use of the railway infrastructure, including track points and junctions (d) train control including signalling, regulation, dispatching and the communication and provision of information on train movement (e) use of electrical supply equipment for traction current, where available (f) all other information required to implement or operate the service for which capacity has been granted.	Directive 2012/32/EU, Annex II
Multimodal rail freight terminals	Multimodal Freight Terminals (IFT) or transfer points are places equipped for the transhipment and storage of Intermodal Transport Units (ITU). They connect at least two transport modes, where at least one of the modes of transport is rail. The other is usually road, although waterborne (sea and inland waterways) and air transport can also be integrated.	PRIME KPI subgroup based on Regulation (EU) 2015/1100 (RMMS), Article 2
Multimodal transport	The carriage of passengers or freight, or both, using two or more modes of transport.	Regulation (EU) No 1315/2013 (TEN-T), Art.3(n)
Network	Principal railway lines managed by the infrastructure manager.	Glossary for Transport Statistics, A.I-02.1

Name	Description	Source
Operations	Operations excluding maintenance. SS-EN 13306:2010 defines operation as: Combination of all technical, administrative, and managerial actions, other than maintenance actions that results in the item being in use. Total annual expenditures for the infrastructure manager on operations includes operations proportion of the infrastructure manager overhead (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and if some parts are handled by contractors, this is also included. (Central or holding overheads are to be allocated proportionally.)	
OPEX, operating expenditures	An operating expense is an expense a business incurs through its normal business operations. Operating expenses include inter alia maintenance cost, rent, equipment, inventory costs, payroll, insurance, and funds allocated toward research and development.	PRIME KPI subgroup
Other accident	Any accident other than a collision of train with rail vehicle, collision of train with obstacle within the clearance gauge, derailment of train, level crossing accident, an accident to person involving rolling stock in motion or a fire in rolling stock. Example: Accidents caused by rocks, landslides, trees, lost parts of railway vehicles, lost or displaced loads, vehicles and machines or equipment for track maintenance	Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.11

Name	Description	Source
Other track	All other tracks than main/running ones: - tracks maintained, but not operated by the infrastructure manager - tracks at service facilities not used for running trains. Tracks at service facilities not used for running trains are excluded. The boundary of the service facility is the point at which the railway vehicle leaving the service facility cannot pass without having an authorisation to access the mainline or other similar line. This point is usually identified by a signal. Service facilities are passenger stations, their buildings, and other facilities; freight terminals; marshalling yards and train formation facilities, including shunting facilities; storage sidings; maintenance facilities; other technical facilities, including cleaning and washing facilities; maritime and inland port facilities which are linked to rail activities; relief facilities; refuelling facilities and supply of fuel in these facilities.	Glossary for Transport Statistics A.I-01.2
Outsourcing	Outsourcing refers to any services provided by outside suppliers on a contractual basis	PRIME KPI subgroup
Passenger	Any person, excluding a member of the train crew, who makes a trip by rail, including a passenger trying to embark onto or disembark from a moving train for accident statistics only	Glossary for Transport Statistics, A.VI-18 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.12

Name	Description	Source
Passenger-km	Unit of measurement representing the transport of one passenger by rail over one kilometre. The distance to be taken into consideration should be the distance travelled by the passenger on the network. To avoid double counting each country should count only the pkm performed on its territory. If this is not available, then the distance charged or estimated should be used.	Glossary for Transport Statistics, A.V-06
Passenger train-km	Unit of measurement representing the movement of all passenger trains over one kilometre. From an infrastructure manager's point of view, it is important to include all passenger train movements as they all influence the deterioration of the rail infrastructure assets. Empty passenger train movements are therefore included in the number of passenger train movements.	Glossary for Transport Statistics, A.IV-07 LICB Web Glossary, p.18
Passenger trains	Train for the carriage of passengers composed of one or more passenger railway vehicles and, possibly, vans moving either empty or under load.	Glossary for Transport Statistics, A.IV-06 and A.IV-05
Permanent restrictions	Restrictions are defined as permanent if they are incorporated within the yearly timetable.	PRIME KPI subgroup
Punctuality	"Punctuality of a train is measured based on comparisons between the time planned in the timetable of a train identified by its train number and the actual running time at certain measuring point. A measuring point is a specific location on route where the trains running data are captured. One can choose to measure the departure, arrival or run through time." "Punctuality is measured by setting up a threshold up to which trains are considered as punctual and building a percentage." When measuring punctuality, the following are to be included all in service trains: freight and passenger but excluding Empty Coaching Stock movements and engineering trains.	UIC CODE, 450 – 2, OR, 5th edition, June 2009, 4, Measurement of punctuality

Name	Description	Source
Railway line	Line of transportation made up by rail exclusively for the use of railway vehicles and maintained for running trains. A line is made up of one or more tracks and the corresponding exclusion criteria.	Glossary for Transport Statistics, A.I-02
Recycling	Reprocessing by means of a manufacturing process, of a used product material into a product, a component incorporated into a product, or a secondary (recycled) raw material, excluding energy recovery and the use of the product as a fuel. Recycling of waste is any activity that includes the collection and processing of used or unused items that would otherwise be considered waste. Recycling involves sorting and processing the recyclable products into raw material and then using the recycled raw materials to make new products.	ISO 18604:2013, 3.3
Renewable energy	Renewable energy is an energy that is derived from natural processes that are replenished constantly, such as energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, solid biomass, biogas, and liquid biofuels	PRIME KPI subgroup

Name	Description	Source
Renewal expenditures	Renewals mean capital expenditures on a major substitution work on the existing infrastructure which does not change its overall original performance. Renewals are projects where existing infrastructure is replaced with new assets of the same or similar type. Usually, it is a replacement of complete systems or a systematic replacement of components at the end of their lifetimes. The borderline to maintenance differs among the railways. Usually, it depends on minimum cost levels or minimum scope (e.g. km). It is capitalised at the time it is carried out, and then depreciated. Renewals include planning (incl. portfolio prioritisation, i.e. which renewal projects are realised when and where), tendering, dismantling/disposal of old equipment, construction, testing and commissioning (when track is opened to full-speed operation). Renewals are generally looked at on the level of annual spending from a cash-flow perspective, i.e. no depreciation or other imputed costs are considered. Excluded from the definition are construction of new lines (new systems) or measures to raise the standard of existing infrastructure triggered by changed functional requirements (and not triggered by lifetime!) or "forced" investments when acting on regulations. It includes its proportion of overheads (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material, (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and contractors (entrepreneurial production) as well as investment subsidies.	PRIME KPI subgroup based on Regulation (EU) 2015/1100 (RMMS), Article 2

Name	Description	Source
Serious injury (seriously injured person)	Any person injured who was hospitalised for more than 24 hours because of an accident, excluding any attempted suicide.	Glossary for Transport Statistics, A. VII-10 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.19
Significant accident	Any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses, and depots.	Glossary for Transport Statistics, A.VII-04 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.1
Significant damage	Damage that is equivalent to EUR 150 000 or more.	Glossary for Transport Statistics, A.VI-04 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 1.2
TAC Total	Includes charges for minimum Track Access Charges for the passenger, freight, and service train path. Mark-ups. No other charging components are included.	
Temporary restrictions	Restrictions that occur during the year that are not included in the yearly timetable.	

Name	Description	Source
TEN-T requirements	Infrastructure requirements as set in Article 39 of the Regulation (EU) No 1315/2013 on Union guidelines for the development of the trans-European transport network. http://publications.europa.eu/resource/cellar/f277232a-699e-11e3-8e4e-01aa75ed71a1.0006.01/DOC_1	Regulation (EU) No 1315/2013 (TEN-T)
Track	A pair of rails over which rail-borne vehicles can run maintained by an infrastructure manager. Metro, Tram, and Light rail urban lines are excluded. Excluded are: - Lines solely used for operating touristic trains and heritage trains - Lines constructed solely to serve mines, forests or other industrial or agricultural installations and which are not open to public traffic - Private lines closed to public traffic and functionally separated (i.e. stand-alone) networks - Private lines used for own freight transport activities or for non-commercial passenger services and light rail tracks occasionally used by heavy rail vehicles for connectivity or transit purposes.	Glossary for Transport Statistics, A.I-01
Track buckle or other track misalignment	Any fault related to the continuum and the geometry of track, requiring track to be placed out of service or have immediate restriction of permitted speed imposed.	Directive (EU) 2016/798 on railway safety, Annex I, Appendix 4.2
Track km	A cumulative length of all tracks maintained by the infrastructure manager; each track of a multiple-track railway line is to be counted.	PRIME subgroup, based on Glossary for Transport Statistics
Trackside	Area adjacent to a railway track such as embankments, level crossings, platforms, shunting yards. Workshops, warehouses, and depots are excluded.	PRIME KPI subgroup

Name	Description	Source
Train	One or more railway vehicles hauled by one or more locomotives or railcars, or one railcar travelling alone, running under a given number or specific designation from an initial fixed point to a terminal fixed point, including a light engine, i.e. a locomotive travelling on its own. In this document we define trains as the sum of passenger trains and freight trains.	Glossary for Transport Statistics, A.IV-05 and A.IV-06
Train-km	The unit of measurement representing the movement of a train over one kilometre. The distance used is the distance run, if available, otherwise the standard network distance between the origin and destination shall be used. Only the distance on the national territory of the reporting country shall be considered.	Glossary for Transport Statistics, A.IV-05 Directive (EU) 2016/798 on railway safety, Annex I, Appendix 7.1
Traffic Management Cost	Costs of functions: Traffic management comprises the control of signal installations and traffic, planning as well as path allocation. Types of costs: Traffic management includes planning, its proportion of overheads (such as financials, controlling, IT, human resources, purchasing, legal and planning), labour (operative, personnel), material, (used/consumed goods), internal services (machinery, tools, equipment including transport and logistics) and contractors (entrepreneurial production).	PRIME KPI subgroup based on UIC studies (CENOS and OMC)
Working timetable	The data defining all planned train and rolling-stock movements which will take place on the relevant infrastructure during the period for which it is in force	Directive 2012/34/EU (SERA), Article .3(28)