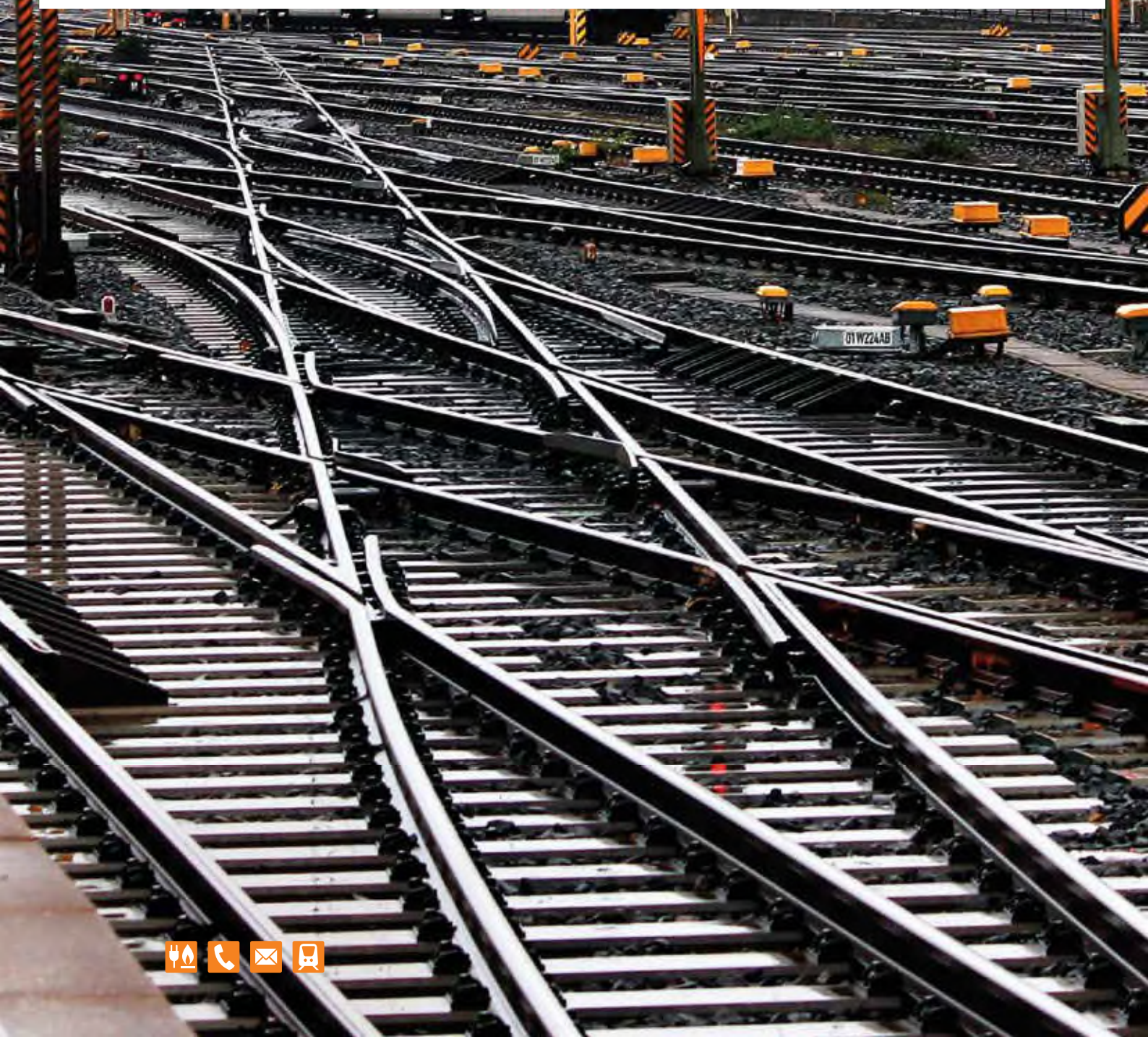




Bundesnetzagentur

# Market Analysis Railway 2017





# Railway Market Analysis 2017

December 2017

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## Table of contents

Table of contents .....	3
The railway market in figures .....	5
Introduction .....	8
The Bundesnetzagentur's mandate in the railway sector .....	8
Background to the market analysis.....	8
Market definition .....	9
Railway market analysis.....	12
Market environment.....	12
Development of the modal split.....	12
Development of employment in the railway market.....	13
Railway transport market.....	16
Market development.....	16
Transport and travel distances in the rail transport market .....	19
Quality of railway transport .....	20
General trends in the competition.....	21
Ownership structure of railway undertakings.....	22
Revenue development in the rail transport market .....	23
Development of retail prices .....	26
Construction measures scheduled by the infrastructure managers.....	28
Comments of railway undertakings regarding construction-related issues.....	30
Comments by the railway undertakings regarding timetable quality and management of and arrangements during disruptions.....	30
Comments by the railway undertakings regarding access to train formation facilities and marshalling yards.....	31
Comments by the railway undertakings regarding the level of non-discrimination in the pricing systems.....	31
Noise-based track access charges .....	32
Rolling stock .....	32
Change in the traction current market.....	35
Renewable energy surcharge payable under the Renewable Energy Sources Act.....	35
Electrical traction in the railway market .....	36
Change of supplier in the traction power network.....	37
Individual network charges.....	37
Regional transport authorities and the short-distance passenger rail transport market .....	40
Revenue development in the short-distance passenger rail transport segment .....	40
Development of contracted transport services.....	40
Conclusion of transport contracts .....	41

Models for financing rolling stock .....	42
Payments the regional transport authorities made to railway undertakings for services in the short-distance passenger rail transport segment .....	42
Factors that influence the regional transport market.....	43
Comments of the regional transport authorities .....	46
<b>Railway infrastructure market.....</b>	<b>48</b>
Infrastructure managers .....	48
Revenue development among infrastructure managers.....	48
Trend in operating performance .....	49
Network statements for railway infrastructure .....	49
Charge schedules .....	50
Ratings for access to railway infrastructure .....	51
Maintenance facilities .....	56
Factory railways.....	57
<b>Infrastructure access charges .....</b>	<b>60</b>
Level and development of track access charges .....	60
Level and development of station charges .....	62
Rating and development of pricing systems .....	63
<b>Economic situation of enterprises operating in the railway market.....</b>	<b>66</b>
Results situation of railway undertakings .....	66
Profit margin of the railway undertakings.....	69
Infrastructure access charges as a percentage of railway undertakings' revenue.....	70
Results situation of non-federally owned infrastructure managers.....	72
Results situation of non-federally owned service facility operators .....	73
Funding .....	73
<b>International market monitoring .....</b>	<b>76</b>
IRG-Rail Market Monitoring .....	76
Rail Market Monitoring Scheme of the European Commission.....	80
<b>Annex.....</b>	<b>82</b>
Method used for rating influencing factors.....	82
DB Netz AG's track access charging system starting 2018.....	83
<b>List of figures .....</b>	<b>85</b>
<b>List of abbreviations.....</b>	<b>88</b>
<b>Legal Notice .....</b>	<b>90</b>



## THE RAILWAY MARKET IN FIGURES

### Revenue development – Railway undertakings

Δ 15/16

2016	Total	€20.1bn	↑
	Rail freight	€5.6bn	↑
	Long-distance passenger	€4.0bn	↑
	Short-distance passenger	€10.5bn	↑

### Revenue development – Infrastructure managers

Δ 15/16

2016	Total	€6.3bn	↑
	Track access charges	€5.0bn	↑
	Station charges	€0.9bn	↑
	Other charges	€0.4bn	→

### Rail traffic

Δ 15/16

2016	Rail freight	126bn tkm	↑
	Long-distance passenger	40bn pkm	↑
	Short-distance passenger	56bn pkm	↑

### Share of rail traffic held by competitors

Δ 15/16

2016	Rail freight	46%	↑
	Long-distance passenger	<1%	→
	Short-distance passenger	26%	↑







# Background to the market analysis

The Bundesnetzagentur works to ensure effective competition in the railway market. To accomplish this, it needs up-to-date, reliable information about the railway market and the railway undertakings operating in it. For this reason, the Bundesnetzagentur gathers information each year and publishes its findings in its Railway Market Analysis.

## Contents

The Bundesnetzagentur's mandate in the railway sector	8
Background to the market analysis	8
Market definition	9



## Introduction

By conducting the market survey and reporting on the market in its Railway Market Analysis, the Bundesnetzagentur helps to identify potential for discrimination and, by doing so, fosters competition.

The Bundesnetzagentur's mandate in the railway sector

In its efforts to ensure effective competition in the railway sector, the Bundesnetzagentur monitors compliance with the legal provisions pertaining to non-discriminatory access to railway infrastructure (tracks and service facilities) and the charging of reasonable, transparent and non-discriminatory prices.

The Bundesnetzagentur's specific duties and powers are set forth in the Rail Regulation Act (ERegG) and the General Railway Act (AEG).

### Background to the market analysis

To be able to fulfil these tasks, the Bundesnetzagentur needs valid, up-to-date information about the railway market in general and railway undertakings in particular.

For this purpose, it has conducted written surveys to collect market data every year since it took up its work in 2006. Each year, in March or April, it sends questionnaires to railway undertakings and other parties with access rights such as regional transport authorities. For the 2016 reporting year, the Bundesnetzagentur sent its questionnaire to more than 1,000 market participants.

The scope of the Bundesnetzagentur's market monitoring activities is defined in Section 17 of the Rail Regulation Act.

This act contains provisions requiring market participants to provide information to the Bundesnetzagentur. Besides the obligation to make available information that is needed for statistical and market monitoring purposes, market participants are also required to provide information on their financial situation.

The obligation to supply information to the Bundesnetzagentur applies to all market participants. "Market participants" also include factory railways, heritage railways and non-standard-gauge railways. The Rail Regulation Act does not allow exemptions from the requirement to participate in the annual market survey. In the event of non-compliance with this requirement, the Bundesnetzagentur can, under Section 67(4) in conjunction with Section 67(1) of the Rail Regulation Act, impose a penalty of up to €500,000.

Due to the market participants' obligation to provide information to the Bundesnetzagentur, the number of enterprises that took part in the market survey during the 2016 reporting period increased compared to previous years.

The results of the survey are published not only in the "Railway Market Analysis" as required by Section 122 of the Telecommunications Act but also in the Bundesnetzagentur's "Annual Report" and in its "Activity Report - Railways" (Section 71 of the Rail Regulation Act). The focus of the latter two publications is on the regulatory aspects of the market, while the "Railway Market Analysis" contains current statistical data and analyses thereof, which interested parties can use to gain insights into the railway sector's structure and development.

The Bundesnetzagentur strives to ensure continuity in its collection and analysis of this data. This continuity gives the surveyed enterprises and parties with access rights a sound basis for their planning activities. Moreover, it is the only way that useful time series can be generated.

In July 2015, the European Commission issued Implementing Regulation (EU) 2015/1100. This Regulation requires Member States to provide the European Commission certain information regarding the development of the railway markets. This is done as part of the Rail Market Monitoring Scheme (RMMS).

The market participants were asked a number of new questions for the 2016 reporting year, including their activity profile in the rail freight transport segment, the amount of non-scheduled service, applications for access to tracks in the non-scheduled service segment, and questions regarding technical aspects of network access.

### Market definition

The Railway Market Analysis 2017 examines the area of transport via railway infrastructure. Railway infrastructure itself is also a focus of this analysis.

Depending on the type of infrastructure they operate, companies are referred to as infrastructure managers or service facility operators. For the market survey, service facilities are further broken down into refuelling facilities, passenger stations, freight yards and freight terminals, marshalling yards, train formation facilities, storage sidings, maintenance facilities and ports.

Unless otherwise indicated, the figures in the following text and diagrams refer to the 2016 reporting year.

An assessment of infrastructure managers' services and charges was carried out as part of the market survey conducted in 2017.

Data from other sources (including Germany's Federal Statistical Office and Federal Railway Authority) were also used for the publication "Railway Market Analysis 2017".

Figure 1 provides an overview of the definition of the market used in the Railway Market Analysis. It should be noted here that rolling stock manufacturers and railway undertakings, for example, can also be railway infrastructure managers as a sub-function of their primary business.

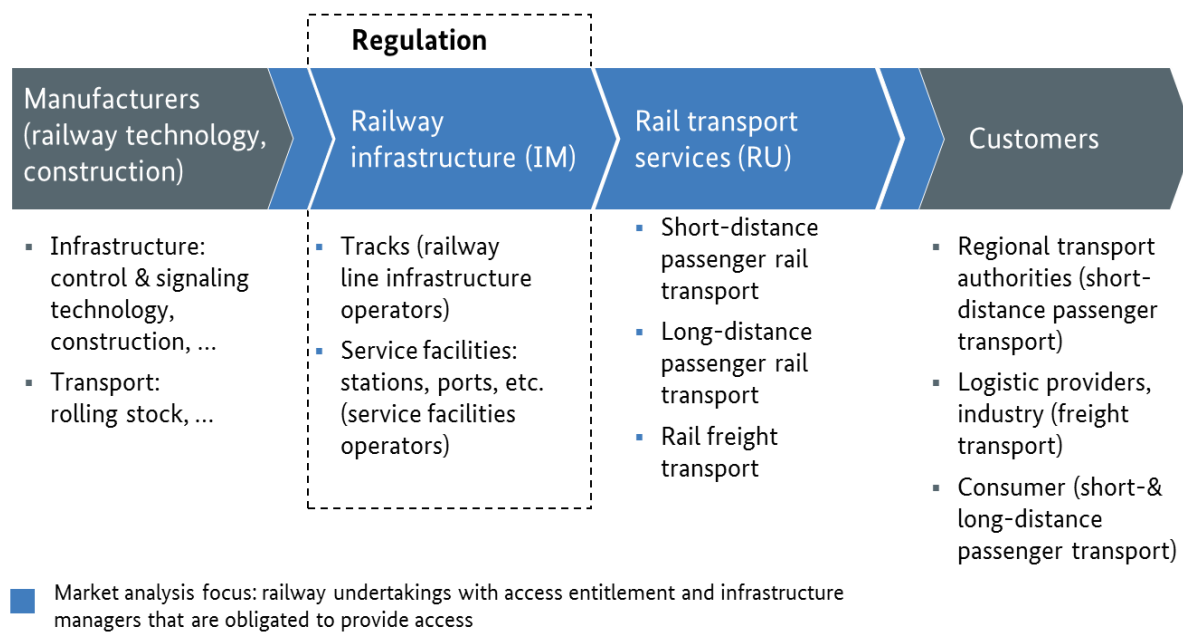


Figure 1: Market definition used in the Railway Market Analysis



## Economic environment

In addition to looking at companies in the railway market, the Bundesnetzagentur examines how the economic environment is developing. This allows it to observe and assess company-specific and railway-specific developments in a broader context.

### Contents

Market environment	12
Development of the modal split	12
Development of employment in the railway market	13



## Railway market analysis

The shares of rail transport in Germany's overall transport volume remained largely stable in a steadily expanding economic environment.

### Market environment

The German economy has developed positively in the years since the crisis in 2009. Based on current forecasts, Germany's real gross domestic product will grow by 2.1 percent over the previous year. The growth expected for 2017 is therefore greater than the growth seen in recent years.

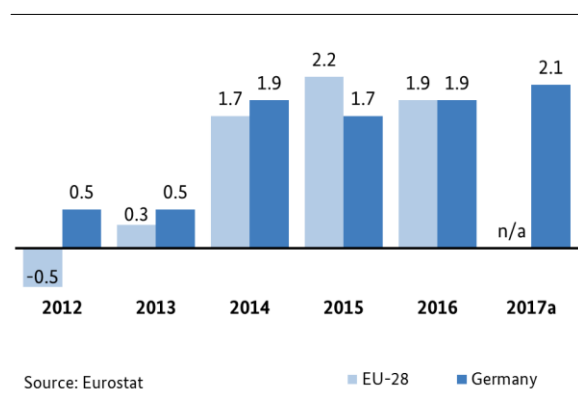


Figure 2: Development of GDP in real terms (2012-2017a; year-on-year increase in percent; "a" = anticipated values)

The European Union's 28 Member States (EU-28) saw a somewhat different development in the past years. The economy in these countries rebounded in 2010 and 2011 but lost pace again in 2012. The gross domestic product for the EU-28 only resumed growing in 2013. Economic growth picked up slightly in 2014 and 2015. The European Union (EU-28) reported 1.9 percent economic growth in 2016. Predictions for the year 2017 are not yet available.

### Development of the modal split

The shares of rail freight transport and inland waterway transport both shrank by 0.4 percent in 2016. The share of road freight transport correspondingly grew by 0.8 percent. The share held by inland waterway transport has steadily declined since 2013. It has now fallen to its lowest level since 2012.

Looking at rail freight transport, its share of the modal split has remained virtually constant at 18 percent in recent years. When the transport performance figures from the Bundesnetzagentur's market survey are used to calculate these shares, the share held by rail transport is somewhat higher at slightly more than 19 percent. This is due to the fact that the Bundesnetzagentur conducts a comprehensive survey which also includes foreign market participants insofar as they independently provide transport services in the German rail network.

The share of road freight transport in the modal split declined slightly between 2015 and 2016. This finding is the same when data provided by the railway undertakings for the Bundesnetzagentur's survey for 2015 and 2016 is examined.

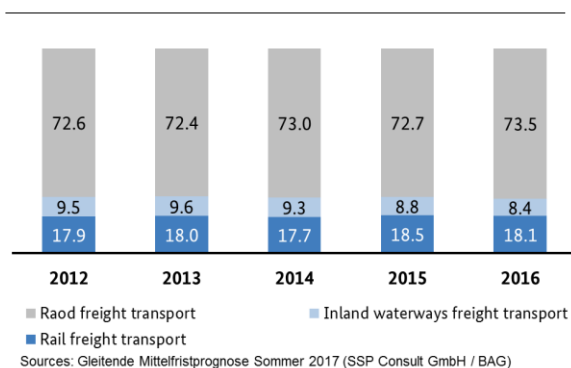


Figure 3: Development of the modal split in the freight transport market (2012-2016; shares in percent)

The market share of rail passenger service increased by 0.1 percentage point in 2016 and now totals 8.2 percent. By contrast, the share of public road passenger transport declined slightly to 7.1 percent during the year under review. All in all, the shares of the combined transport services held by the individual modes changed only slightly during the period under review.

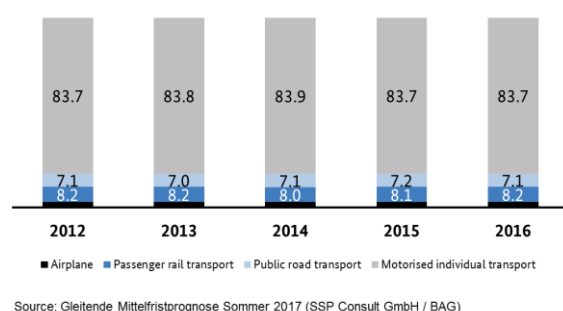


Figure 4: Development of the modal split in the passenger transport segment (2012-2016; shares in percent)

#### Development of employment in the railway market

After having steadily fallen until the year 2010, the number of workers employed in the railway

sector (measured in terms of full-time equivalents<sup>1</sup>) has been on the rise since 2012. Employment continued to grow at an even faster pace in 2016. All in all, there are approximately 151,000 full-time positions in the railway market.

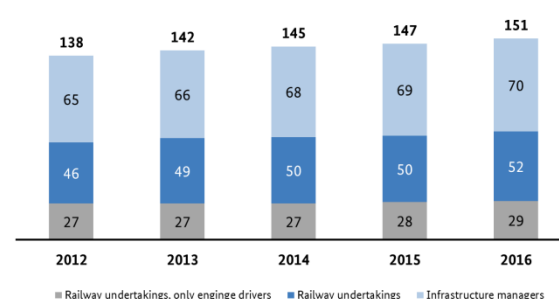


Figure 5: Development of employment in the railway market (2012-2016; thousands of full-time equivalents)

#### Availability of personnel

As part of the market survey, railway undertakings have the opportunity to rate the availability of personnel, using a scale from 1 ("good availability") to 5 ("places company's existence at risk") for the areas train drivers, technical operational railway personnel and other personnel.

The surveyed railway undertakings rated the availability of personnel slightly worse than in the previous year.

The situation is particularly strained in the case of train drivers, repeating the picture seen in the previous year. Somewhat more than half of the

<sup>1</sup> This means that part-time positions are calculated as partial full-time positions, based on the number of working hours.

respondents view the situation here as “problematic”. At the same time, the number of respondents who rated this point as “satisfactory” rose approximately eight percent.

Nearly half of the railway undertakings rate the availability of other personnel as “average”, with the average mark from the previous year (2.6) falling off to 2.7. The availability of other technical operational railway personnel received a “satisfactory” rating from nearly 40 percent of the respondents and “problematic” from nearly one third.

The infrastructure managers surveyed came to similar conclusions in their assessment of personnel availability. Approximately half of the respondents rated the availability of other personnel as “good”. Compared to the previous year however, the respondents were more critical in their assessment, with the average marks worsening slightly.

The railway undertakings are currently in a phase in which they are increasing their personnel. Furthermore, they are seeing greater outflows due to the age structure of their workforces (demographics). These two factors are clearly leading to a shortage of skilled labour. Railway undertakings have to counter this shortage by conducting training programmes of their own.

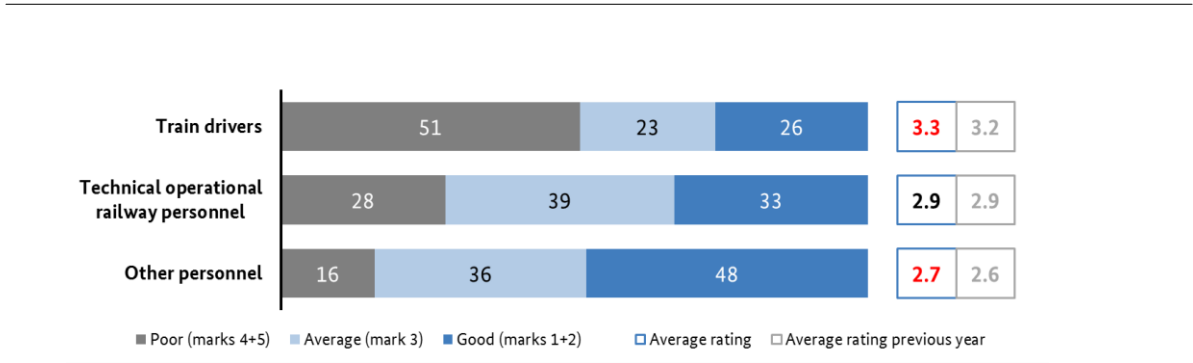


Figure 6: Availability of personnel for railway undertakings (2017; rating shares in percent and average marks)

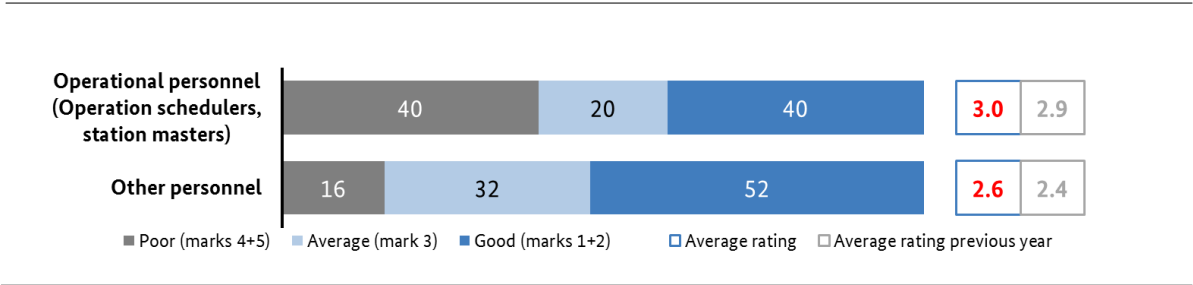


Figure 7: Availability of personnel for infrastructure managers (2017; rating shares in percent and average marks)



# Railway transport

The railway market is broken down into the transport market and the infrastructure market.

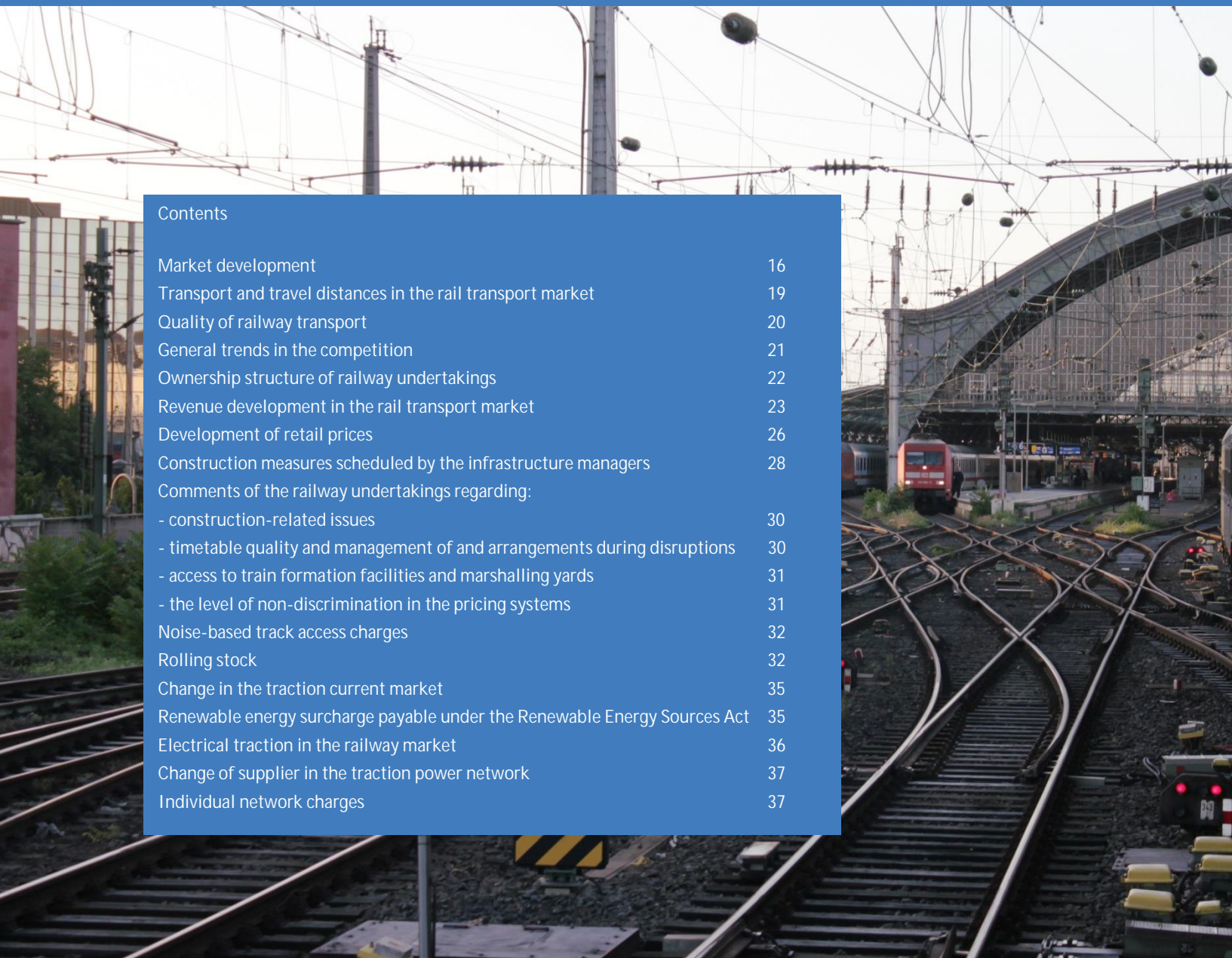
Railway undertakings provide rail transport services.

The Bundesnetzagentur monitors railway undertakings.

Based on this information, it determines how well the railway market is functioning and how efficient it is.

## Contents

Market development	16
Transport and travel distances in the rail transport market	19
Quality of railway transport	20
General trends in the competition	21
Ownership structure of railway undertakings	22
Revenue development in the rail transport market	23
Development of retail prices	26
Construction measures scheduled by the infrastructure managers	28
Comments of the railway undertakings regarding:	
- construction-related issues	30
- timetable quality and management of and arrangements during disruptions	30
- access to train formation facilities and marshalling yards	31
- the level of non-discrimination in the pricing systems	31
Noise-based track access charges	32
Rolling stock	32
Change in the traction current market	35
Renewable energy surcharge payable under the Renewable Energy Sources Act	35
Electrical traction in the railway market	36
Change of supplier in the traction power network	37
Individual network charges	37



## Railway transport market

A growing number of enterprises operate in the railway transport market. The revenue generated in this market has increased moderately from year to year. The volume of transport services provided in 2016 increased.

### Market development

Under Section 3(1), No. 1 of the General Railway Act, a public railway undertaking is a railway undertaking that is run on a commercial basis and may be used by anyone to convey persons or goods. The Federal Railway Authority's register of public railway undertakings indicates that their number increased up to the year 2014 and then stagnated in 2015 and 2016. In September 2017, 451 railway undertakings were licensed to provide rail transport services for the public.

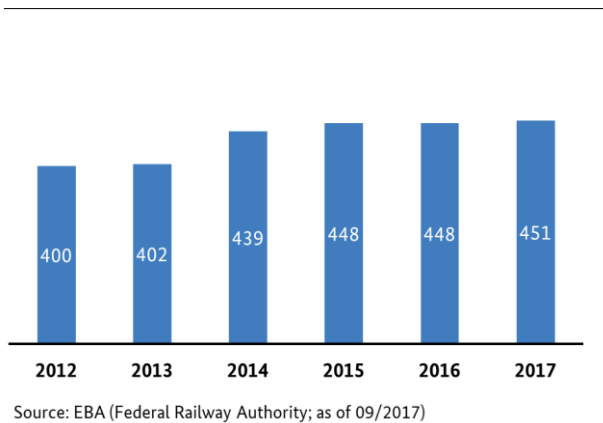


Figure 8: Licensed public railway undertakings (2012-2017; number of railway undertakings in Germany)

According to the Bundesnetzagentur's annual survey, more than 340 railway undertakings were actively involved in providing railway services in Germany, representing an increase over the previous years and the highest number to date. Compared to other countries, the number of competitors in the German railway market is one of the highest.

A total of 180 railway undertakings provided commercial rail freight services. One hundred and thirty-six railway undertakings provided short-distance passenger rail transport services.

The number of railway undertakings operating in the long-distance passenger rail transport segment remained small. Approximately 26 mostly smaller railway undertakings provided transport services in this segment. The vast majority of these railway undertakings focuses exclusively on providing special non-scheduled rail services and consequently do not compete with regular (interval) services.

A number of railway undertakings provide transport services in the passenger rail transport segment and in the rail freight segment.

The growth seen in the cumulative revenues in the railway market in recent years continued through the reporting period. Revenue growth from 2015 to 2016 totalled a little more than five percent. Total revenue generated by railway undertakings in 2016 reached €20.1 billion, with revenue in the rail freight transport segment growing from €5.2 billion to €5.6 billion year-on-year. Revenue in the short-distance passenger rail transport segment increased from €10.1 billion to €10.5 billion. In the long-distance passenger rail transport segment, revenue rose slightly, from €3.9 billion to €4.0 billion.

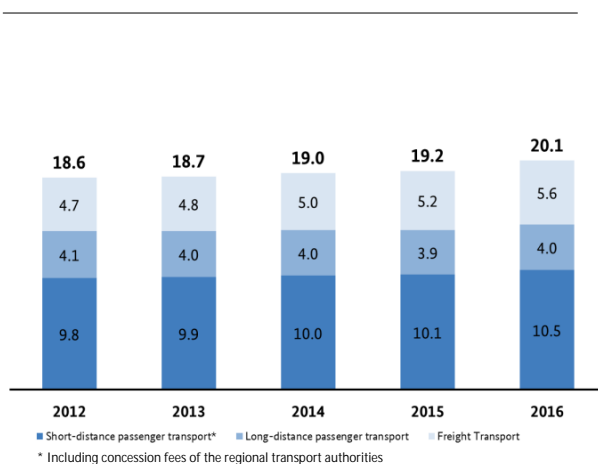


Figure 9: Revenues in the railway market (2012-2016; € billion)

Transport volume in the passenger rail transport segment rose to a new high in 2016.

The short-distance passenger rail transport segment transported 2.64 billion passengers, a total of 50 million more passengers than in 2015. This represents an increase of nearly two percent.

Approximately 139 million passengers were transported in the long-distance passenger rail transport segment in 2016. This represents an increase of a little more than five percent over the previous year.

A total of 418 million tonnes of freight were transported in the rail freight segment, more than in 2015. This increase was however solely due to the larger number of railway undertakings that provided data for the survey. A comparison of the figures from those railway undertakings that provided information for both 2015 and 2016 reveals a decline of two million tonnes.

In contrast to transport volume (freight volumes or number of passengers), transport performance additionally takes average transport or travel distances into account.

Transport performance improved again in both the short-distance and the long-distance passenger rail transport segments.

Transport performance in the short-distance passenger rail transport segment improved slightly, increasing to 56 billion passenger-kilometres, continuing the trend observed in recent years.

Transport performance in the long-distance passenger rail transport segment improved, increasing from 37 billion to 40 billion passenger-kilometres from 2015 to 2016.<sup>2</sup> This represents an increase of a little more than eight percent, a level that has not been achieved in many years. The improved performance in this segment was fuelled by price-driven responses - particularly DB Fernverkehr AG's budget fares - to the growing competition from long-distance bus service.

According to data from the Bundesnetzagentur, transport performance in the rail freight segment reached 126 billion tonne-kilometres. The year-on-year increase was due to the fact that the Bundesnetzagentur's market survey collected information on the transport performance of new railway undertakings which had not taken part in the market survey in previous years. Undertakings which had reported figures on their transport performance in 2015 and 2016 posted a slight decline of approximately 0.5 billion tonne-kilometres.

<sup>2</sup> For comparison: Based on statistics from the Federal Office for Goods Transport, total intercity coach service accounted for approximately 7.3 billion passenger-kilometres. In the years 2013 through 2015, this category reported the fastest growth rates out of all modes of passenger transport in Germany. Transport performance in the long-distance bus transport segment declined slightly to 7.15 billion passenger-kilometres in 2016.

Figures for transport performance and transport volumes from the Bundesnetzagentur's market analysis are a great deal higher than those from the Federal Statistical Office.

This is primarily due to the fact that the Bundesnetzagentur conducts full surveys. It additionally receives information from foreign enterprises that provide transport services in the rail freight sector in Germany. In this case, Germany's Federal Statistical Office does not receive all the data reports from these enterprises, which however provide them to the Bundesnetzagentur.

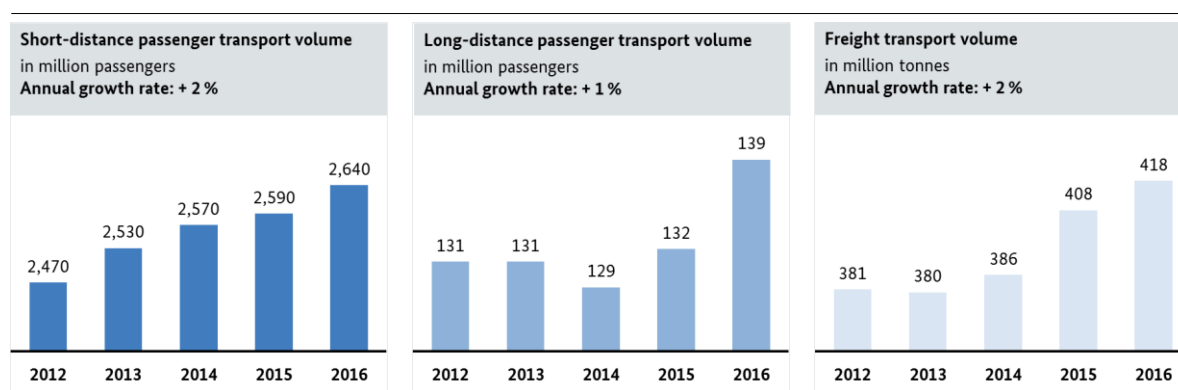


Figure 10: Development of transport volumes broken down by type of transport service (2012-2016; in million passengers/in million tonnes of freight)

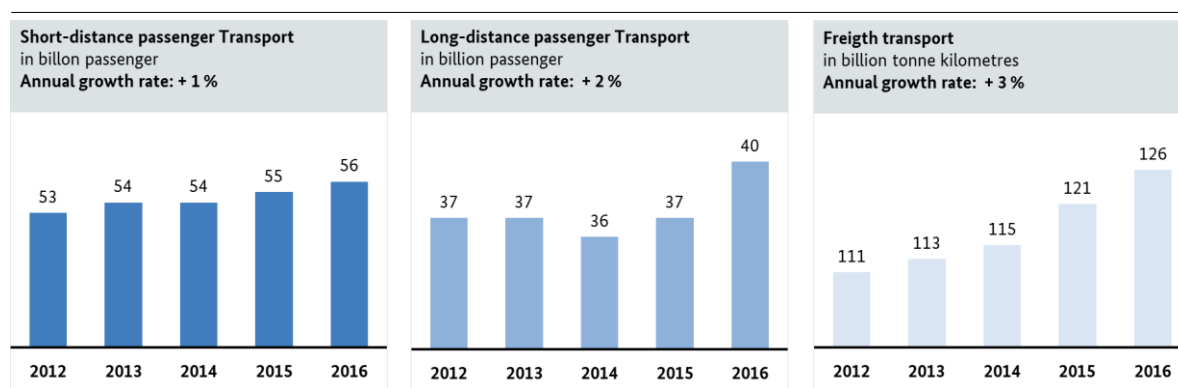


Figure 11: Development of traffic broken down by type of transport service (2012-2016; in billion passenger-kilometres/tonne-kilometres)



### Transport and travel distances in the rail transport market

The following figure shows the average transport and travel distances calculated on the basis of the respective quotient of traffic volume and transport volume.

The average travel distance in the short-distance passenger rail transport segment remained unchanged at 21 kilometres in 2016.

In the long-distance passenger rail transport segment, the average travel distance increased slightly, from 280 to 284 kilometres in 2016, after having initially declined in previous years and then stagnating in 2014 and 2015.

The average transport distance in the rail freight segment increased from 297 to 303 kilometres. This is partly due to the fact that for 2016 more data is available from foreign railway undertakings which tend to cover longer distances in the German railway network than the average reported by the other undertakings.

When looking at average travel and transport distances, it should be remembered that the Bundesnetzagentur takes only inland transport services into account in its market analysis. As a result, only those passenger-kilometres, tonne-kilometres and train-path kilometres from cross-border services that were provided within Germany's borders are included in the survey data.

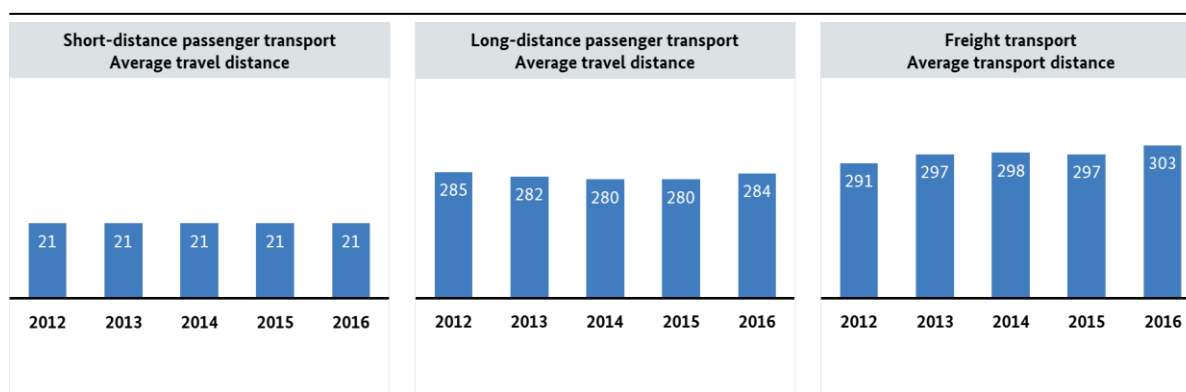


Figure 12: Development of average transport and travel distances (2012-2016; in km)

## Quality of railway transport

### Punctuality

A passenger train is considered to be delayed when it runs at least five minutes behind schedule. A freight train is considered to be delayed when it runs at least 15 minutes behind schedule.<sup>3</sup>

Infrastructure managers have the opportunity, in the course of the Bundesnetzagentur's annual market survey, to provide statistics regarding train punctuality.

The share of delayed trains out of all trains in operation was slightly more than four percent in the short-distance passenger rail transport segment. There were no changes over the previous years.

Approximately 75 percent of the trains in the long-distance passenger rail transport segment were punctual in 2016.

The share of delayed trains out of all trains in operation was more than 31 percent in the national rail freight transport segment; this means that approximately 69 percent of the trains were punctual. A little more than 67 percent of the freight trains travelling on the tracks in Germany in 2015 were punctual.

The share of delayed trains out of all trains in operation was more than 30 percent in the cross-border rail freight transport segment; this means that approximately 70 percent of the trains were punctual.

### Contractual penalties/ penalty payments that railway undertakings pay to the regional transport authorities

According to the Bundesnetzagentur, railway undertakings paid more than €150 million in contractual penalties/penalty payments to the regional transport authorities in the 2016 reporting year. This figure was more than €152 million in the previous reporting period. These payments therefore declined by a little more than one percent between 2015 and 2016.

### Refunds made to passengers

Railway undertakings refunded more than €24.7 million to passengers in 2016 for reasons that included compliance with passenger rights provisions or as a gesture of good will. This represents a decline of a little more than 12 percent compared to 2015.

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<sup>3</sup> These limits have been standardised in the European Commission's Implementing Regulation (EU) 2015/1100. In Germany however infrastructure managers still apply different limits. For example, the limits used by DB Netz AG are six minutes and 16 minutes respectively.

### General trends in the competition

The positive development in competition in the rail freight transport segment continued through the year 2016. Competitors gained further market share and now hold 46 percent of the rail freight transport market.

Looking at the passenger rail transport segment, competitors were able to grow their market share only in the short-distance passenger rail transport segment in 2016.

Measured in terms of transport performance, the market share held by the competitors in the short-distance passenger rail transport segment increased to 26 percent, continuing the trend observed in the previous years.

As in previous years, the share held by competitors in the long-distance passenger rail transport segment is significantly less than one percent. As a result, the market leader continued to dominate the long-distance passenger rail transport segment, with the exception of a few connections which were offered by Thalys, HKX and other providers in 2016.

One reason why the competition in this sector is so rudimentary is that sizable investments must be made in suitable rolling stock in combination with ensuring safety when accessing and using infrastructure.

For operators, the availability of line capacity that can be used on a medium or long-term basis on attractive routes during suitable time slots is very important for being able to provide economically viable long-distance passenger rail transport service.

Lastly, long-distance passenger rail transport has on average the highest track access charges compared to the other modes of transport. This is one reason why long-distance passenger rail transport operates on a deficit basis on certain line sections and why, from an economic standpoint, service in many cases cannot be offered for sections where demand is weak.

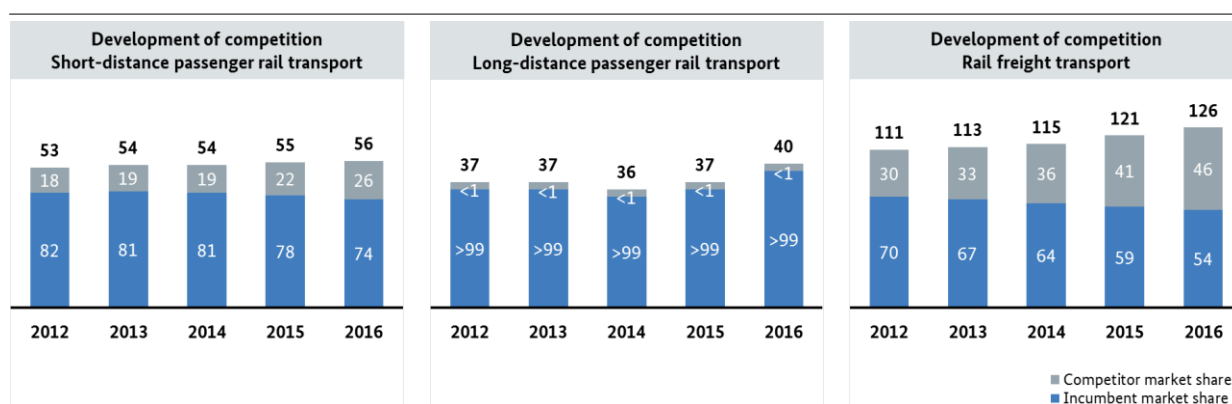


Figure 13: Development of the competition, broken down by type of transport service (2012-2016; traffic handled in billions of passenger/tonne km and percentages based on passenger/tonne km)

### Ownership structure of railway undertakings

In the wake of the liberalisation of the German railway market which was part of the 1994 Railway Reform, Deutsche Bahn AG (DB AG) railway undertakings faced ever-growing competition from other railway undertakings in the following years.

At the same time, the German railway market is also attractive for foreign railway undertakings. Besides privately run railway undertakings, state-owned railways of other European countries operate in the German railway market and compete with state-owned and privately owned companies.

Railway undertakings belonging to Deutsche Bahn AG continue to be the dominant force, measured in terms of the volume of the transport services they provide.

When however federally owned railway undertakings are disregarded, it is apparent that the remaining competition in the short-distance passenger rail transport segment is divided between three groups of owners: Germany's federal states and local authorities (29%), privately owned companies (25%) and subsidiaries of foreign state-owned railways (46%).

In the rail freight market, railway undertakings owned by Germany's federal states or local authorities play a less important role, accounting for only ten percent of the transport services provided by non-federally owned railways. State-owned railways of other countries provide 40 percent of the total transport services, while privately operated railway undertakings with registered offices in Germany account for 42 percent. Railway undertakings with registered offices in other countries (not including state-owned railways) accounted for eight percent of the combined transport performance of all the competitors in the German market.

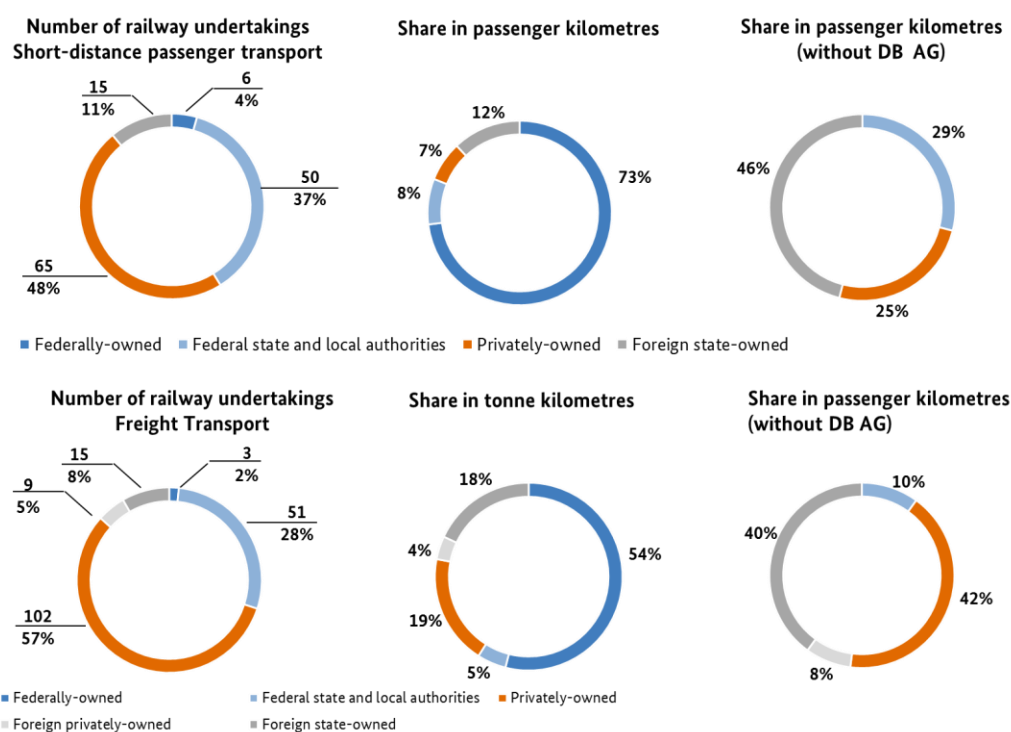


Figure 14: Ownership structures of railway undertakings (2016; number/share of traffic handled in percent)



## Revenue development in the rail transport market

The revenue generated per train-path kilometre travelled in the short-distance passenger rail transport segment rose slightly compared to 2015 to a total of €15.20 per train-path kilometre. The revenue generated per passenger-kilometre in the short-distance passenger rail transport segment has remained more or less constant since 2012.

In 2016, railway undertakings generated revenue of 18.9 cents per passenger-kilometre in the short-distance passenger rail transport segment.

In contrast to the trend seen in recent years, the average train occupancy decreased slightly in 2016.

The second chart below shows the figures for non-federally owned railways. Compared to the overall figures for short-distance passenger rail transport service, non-federally-owned railways saw a slight decline in the amount of revenue generated per passenger-kilometre. On the other hand, the average train occupancy reported by non-federally owned railways increased slightly.

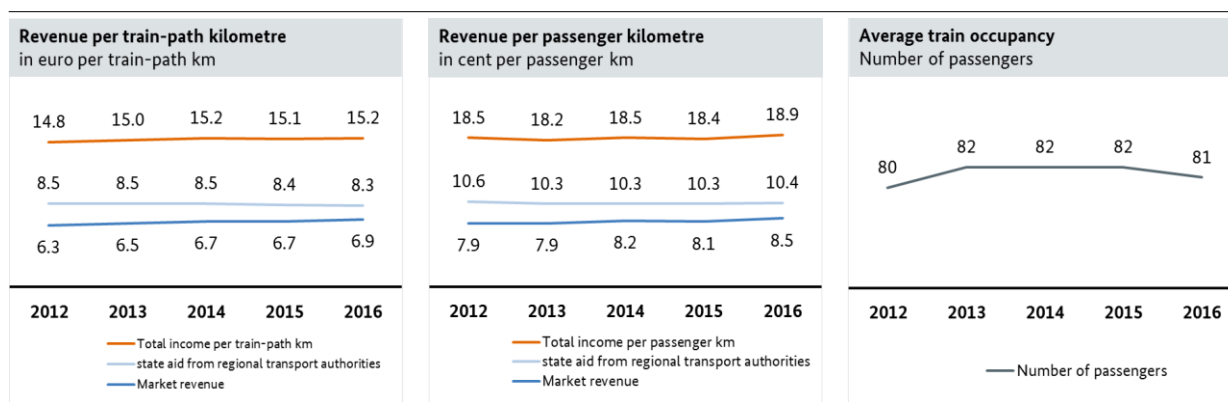


Figure 15: Development of revenues and average train occupancy in the short-distance passenger rail transport (2012-2016)

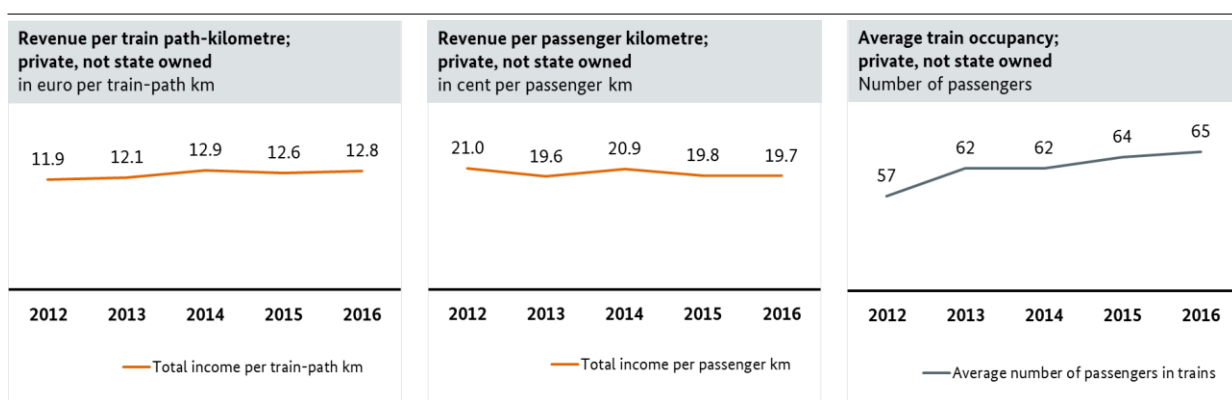


Figure 16: Development of revenues and average train occupancy of not state owned railways in the short-distance passenger rail transport (2012-2016)

Since average train occupancy is much higher in the long-distance passenger transport segment than in the short-distance transport segment, revenue per train-path kilometre travelled is approximately twice as high in the short-distance passenger transport segment. However since subsidies are generally not paid in the long-distance passenger transport segment, revenue – approximately 10.2 cents per passenger-kilometre – is significantly lower than in the short-distance segment, where revenue is 18.9 cents per passenger-kilometre. Revenue per passenger-kilometre in the long-distance passenger rail transport segment continued to decrease in the years 2014 through 2016. This is probably due to price adjustments that DB Fernverkehr AG undertook to reflect the level of the fares charged in the long-distance intercity coach service market.

A comparison: In the 2016 market analysis issued by the Federal Office for Goods Transport (BAG) in November 2016, revenues per passenger and kilometre travelled in the long-distance intercity coach service segment were approximately 11 cents per passenger-kilometre during the fourth quarter of 2012 according to figures from IGES Institut GmbH. Revenues fell sharply in the following years, declining to approximately nine cents per passenger-kilometre in 2015.

Revenue generated per train-path kilometre travelled in the long-distance passenger rail transport segment reached €28.30 in 2016, slightly less than in 2015. This level has however remained more or less constant since 2012.

Following a sharp increase in 2015, the average number of passengers per train in the long-distance passenger rail transport segment rose once again, from 268 to 276.

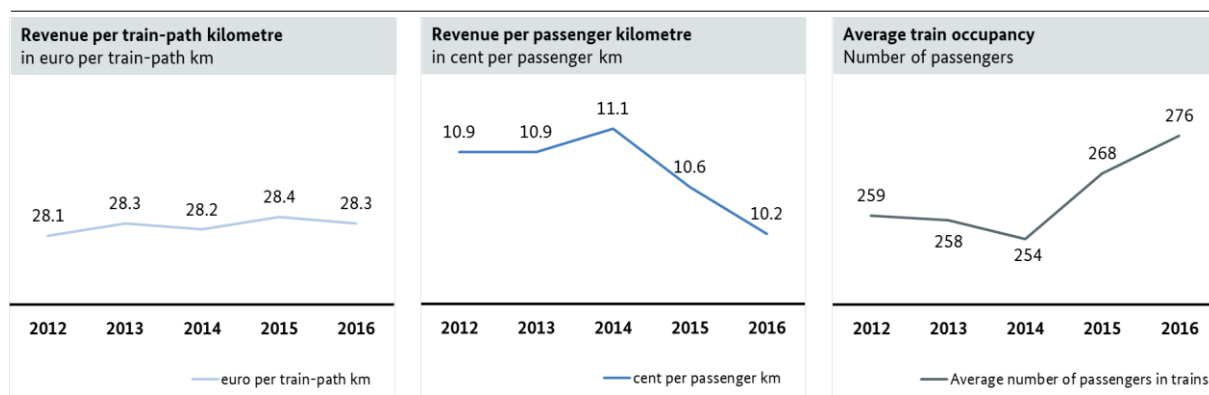


Figure 17: Development of revenues and average train occupancy in the long-distance passenger rail transport (2012-2016)

In the rail freight segment, revenue generated per tonne-kilometre rose slightly in 4.2 to 4.3 cents.

The transport volume per train was 500 tonnes in 2016. The reported increase in the transport volume was largely due to the inclusion of more railway undertakings in the statistics for the year 2016.

This is also the reason for the comparatively large increase in revenue per train-path kilometre which rose to €21.60 per train-path kilometre in 2016.

The second chart below shows the figures for non-federally owned railways. The changes in the average transport volume and in revenue per train-path kilometre are likewise due to the inclusion of data from additional railway undertakings in the statistics for 2016.

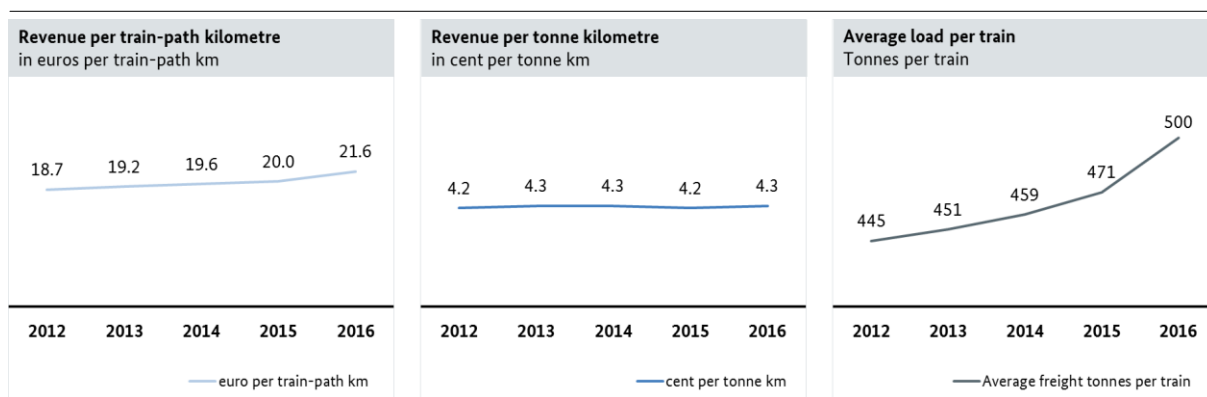


Figure 18: Development of revenue and average freight tonnage in the rail freight transport (2012-2016)

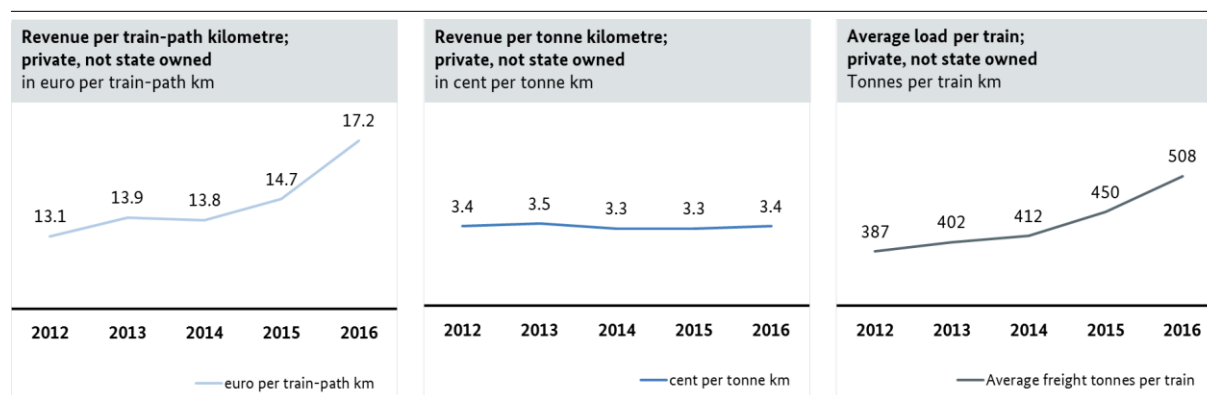


Figure 19: Development of revenues and average freight tonnage of not state owned railways in the rail freight market (2012-2016)

### Development of retail prices

The Bundesnetzagentur's regulatory activities in the railway sector affect prices for passengers of railway undertakings only indirectly because the regulated infrastructure usage charges comprise only part of the fare and transport prices to be paid. However, ticket prices - alongside convenience and the range of the offerings - are very important when assessing how attractive passenger rail services are or how competitive they are at intermodal level. This is also the case with transport charges in the rail freight market.

In order to assess how retail prices have developed, the Bundesnetzagentur draws on indices made available to the public by the Federal Statistical Office and on its own data analyses. The indices published by the Federal Statistical Office show the development of prices for precisely-defined services based on the same fixed quantities, whereas the average revenue per tonne-kilometre or passenger-kilometre as determined by the Bundesnetzagentur additionally reflects differences in the quantities of the demanded products or services.

For example, changes in the demand for rail passes or discount offers such as special prices or the Bahncard (railcard) can impact the development of these particular market revenues.

Therefore, the price indices published by the Federal Statistical Office tend to reflect the perspective of end customers who follow the

development of prices for specific services. By contrast, examining specific charges allows for a more precise assessment of the revenue development from the railway undertakings' perspective.

Fares in the short-distance passenger rail transport segment have increased steadily in recent years. The total increase from 2012 and 2016 amounts to 11.4 percent. On the other hand, looking at the railway undertakings, fare revenue per passenger-kilometre (pkm) increased by approximately eight percent and total revenue per passenger-kilometre, including public subsidies, grew by only about two percent. The share that public subsidies represent in the price of a ticket has fallen somewhat in recent years.

Ticket prices in the long-distance passenger rail transport segment have also risen faster than the revenues generated per passenger-kilometre. The renewed decline in these revenues in 2016 was due to the greater number of reduced-price tickets being offered in response to the intermodal competition that has grown significantly in recent years as a result of long-distance intercity coach service.

Looking at the rail freight transport market, the average revenue generated by railway undertakings per unit of measure (tkm) rose for the first time since 2013. The freight prices reported to the Federal Statistical Office also increased once again.



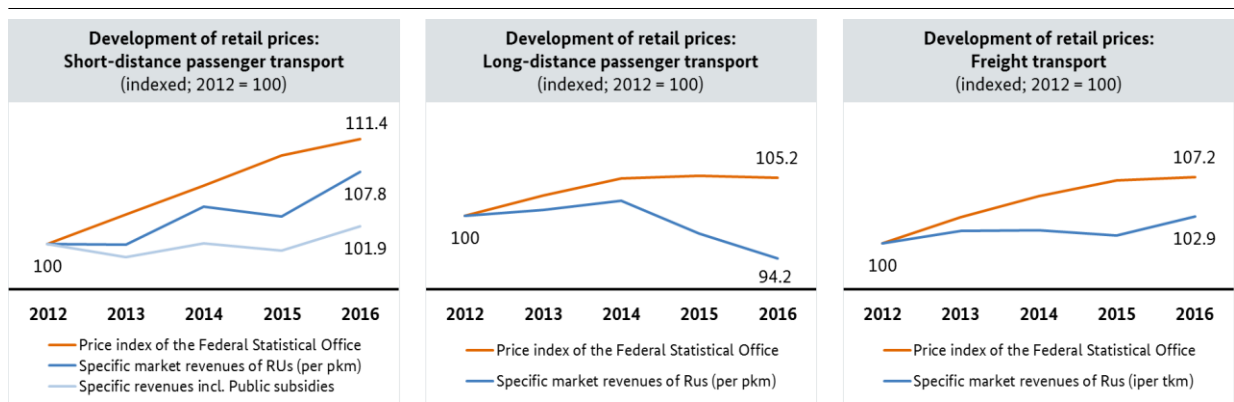


Figure 20: Development of retail prices (2012-2016; indexed 2012 = 100)

Construction measures scheduled by the infrastructure managers

As part of the market survey, infrastructure managers have the opportunity to draw attention to issues or problems that are important to them. In addition to rating general influencing factors (see the chapter “Ratings for access to railway infrastructure”), railway undertakings can voice their concerns about specific issues. The comments received during the survey carried out in 2017 revolved particularly around the issues: construction measures scheduled by the infrastructure managers, timetables, scheduling and communication. Although the ratings given the influencing factors “timetable quality” and “train operation during disruptions” tended to be positive, a large number of railway undertakings commented in greater detail about these specific issues.

Looking at the subject of scheduled construction measures to be undertaken by the infrastructure managers, railway undertakings have the opportunity to provide their own assessment, based on a scale from “applies completely / very often” to “average” all the way to “does not apply/applies only seldom”. Figures 21 and 22 show how the respondents rated this set of topics.

Approximately 80 percent of the railway undertakings indicated that they had frequently been informed on a timely basis of construction measures scheduled in the working timetable. At 1.9, the rating for this set of topics improved slightly over the result from the previous year (2.0).

More than 60 percent of the railway undertakings surveyed stated that they had received timely information regarding construction measures to be conducted during the course of the year. The overall average value worsened slightly, from 2.2 in the previous year to 2.4 in the latest survey.

Half of the railway undertakings reported that they had been included during the planning of the construction measures. However approximately one out of every four said they were rarely included in the planning of construction measures. The average rating here improved from 2.8 in the previous year to 2.7.

Approximately half (48 %) of the railway undertakings reported that they were seldom able to exert any influence on the planning of construction measures. Only slightly more than one-quarter of the railway undertakings were able to frequently exert influence on the planning of construction measures. The average rating in this category worsened, from 3.4 to 3.5.

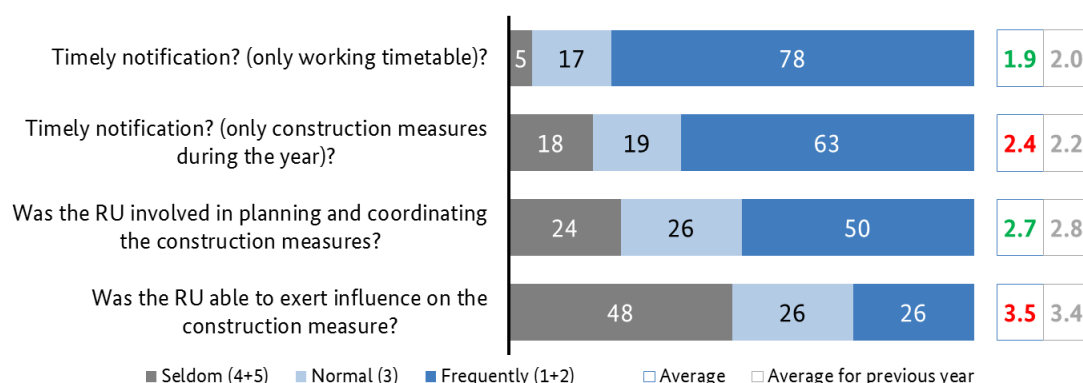


Figure 21: Ratings of the construction measures scheduled by infrastructure managers (2017; ratings in percent and average marks)

The last value in particular clearly shows where railway undertakings consider the infrastructure managers' greatest deficits to lie. The railway undertakings' requirements and the infrastructure managers' activities are not in line with one another.

Approximately one-third (32 %) of all railway undertakings were affected relatively frequently by late notifications of changes in plans or deviations from the original plans for construction measures. Compared to the previous year, this figure worsened, from 2.4 to 2.7.

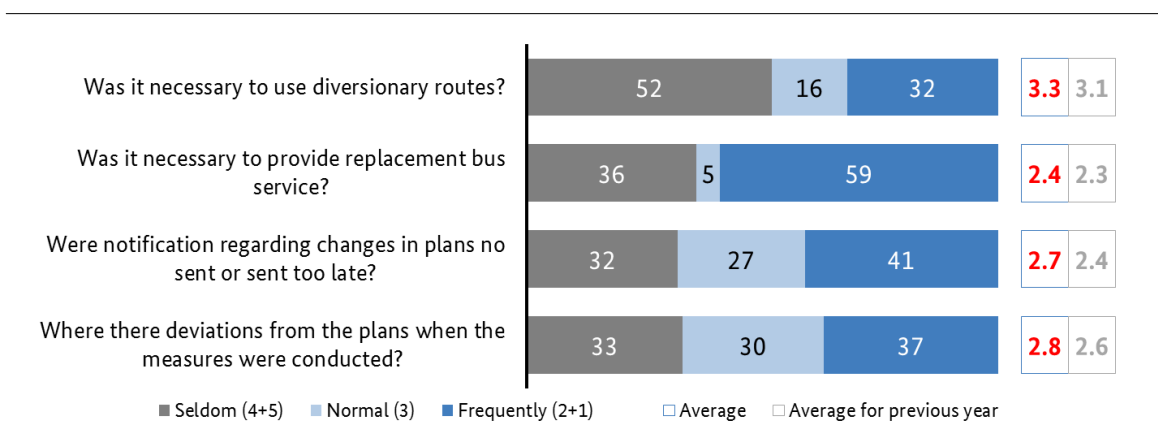


Figure 22: Ratings of the infrastructure managers' scheduled construction measures (2017; ratings in percent and average marks)

A total of 52 percent of the railway undertakings said that it was often necessary to use diversionary routes due to construction measures. Compared to the previous year, the average rating worsened, from 3.1 to 3.3.

More than half (59%) of the railway undertakings reported that it was seldom necessary to provide replacement bus service during construction measures. The overall average for this set of topics worsened from 2.3 to 2.4.

About one out of every three (33%) railway undertakings stated that there were frequent deviations from the original plans when construction measures were conducted. The average rating worsened from 2.6 to 2.8.

In their supplemental comments, the participating railway undertakings went into these subjects in greater detail, as outlined in the following pages:

## Comments of railway undertakings regarding construction-related issues

The lack of sufficient storage sidings was also criticised in connection with construction measures. The already difficult capacity utilisation situation<sup>4</sup> is further aggravated by the parking of construction machinery. The lack of alternatives has forced railway undertakings to agree on compromises among themselves.

However, construction measures lead first and foremost to technical problems and disruptions in railway undertakings' operations. For example, at some train stations, stops can be made only with the help of alternative measures and in some cases not at all. In some instances, operations on certain routes were discontinued for several days during the year under review. This was largely due to poor planning of the construction measures and a general lack of coordination of the measures. The railway undertakings criticised that there is no overall coordination of construction measures to prevent construction from being done on both main routes and diversionary routes at the same time.

Another point of criticism expressed by the railway undertakings was the reliability of the announced time frames for the respective construction measure. These time frames were frequently not adhered to, they noted. The associated uncertainty reportedly hampers the railway undertakings' planning of operations.

In the area of "timetable quality" and "management of and arrangements during disruptions", railway undertakings criticised information and communication practices in connection with construction sites. This

criticism particularly focused on the closure of storage sidings and railway platforms which is not announced in advance as a rule and often leads to significant difficulties in the railway undertakings' operations. Discrepancies between the list of out-of-course runnings and the schedule order also drew criticism.

## Comments by the railway undertakings regarding timetable quality and management of and arrangements during disruptions

The railway undertakings' criticism of "timetable quality" and "management of and arrangements during disruptions" can be divided into several different thematic issues. The most frequently cited issue was differences in treatment during train-path allocation. Firstly, Deutsche Bahn trains were said to receive preferential treatment over the trains of independent railway undertakings. Secondly, general discrimination against individual transport services purportedly exists. The preferential treatment given passenger rail service, the respondents pointed out, leads to discrimination against freight transport and other non-scheduled rail service when there is too much regular interval service. This leads to long idle times and frequent overtaking, they noted. Similarly, the railway undertakings criticised scheduling and operational arrangements during disruptions. Here too, Deutsche Bahn trains were reportedly favoured or, for example, empty trains were given priority over regular passenger trains.

Poor communication and delays in the provision of timetables were also frequently criticised points. The respondents noted that, in the case of non-scheduled rail service, timetables are frequently made available only after the train has departed. They also complained about difficulties in contacting operations control centres during disruptions. As a result, it is virtually impossible to coordinate all parties involved, they said. Furthermore, the railway

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<sup>4</sup>"Difficult capacity utilisation situation" means that suitable storage sidings can be found only with difficulty.



undertakings say the decisions regarding the scheduling of and arrangements made for disruptions do not make sense. They indicated that they are not consulted when difficulties arise during train-path construction and their preferred routes are not taken into consideration.

The quality of the training of the staff working in the operations control centres draws similar criticism. Staff often lack sufficient information about the specifics of the individual route, or are located too far away from the actual operations on site due to centralisation. Therefore, in actual day-to-day practice, timetables are not adhered to and possibilities for other arrangements or rescheduling are not recognised. Furthermore, the size of the area to be handled by the individual responsible for rescheduling and other arrangements during disruptions appears to be too large; respondents said this is apparent when disruptions occur at several locations at the same time.

The railway undertakings also criticised infrastructure condition and level of utilisation and the problems arising from them. The timetables for the routes are so full, they say, that there are delays and cancellations. Such disruptions result in long waits at signals and can even lead to major disruptions that affect the entire system.

According to the respondents, such disruptions are due not only to the fact that routes are being used to capacity but also to the large number of construction sites. For this reason, normal train paths reportedly can no longer be used and travel times are significantly longer when special paths are used. For railway undertakings, deviations lead to high track access charges and energy costs. This in turn affects the railway undertakings' profitability.

Comments by the railway undertakings regarding access to train formation facilities and marshalling yards

The railway undertakings' criticism in this area focused almost exclusively on the lack of availability of corresponding train formation facilities and storage sidings. As they see it, Deutsche Bahn has dismantled so many facilities, and the facilities that are still in operation have no tracks available, particularly for third-party railway undertakings. Furthermore, the considerable organisational effort made necessary by the use of various different track reservation processes was criticised, as were the excessive costs for using these facilities.

Comments by the railway undertakings regarding the level of non-discrimination in the pricing systems

The railway undertakings say that the track access prices are too high overall, based on a comparison with road transport and European rail transport. They complained about the lack of transparency in the pricing systems with equal frequency. They explicitly cited the transport service factor for station stops in the long-distance passenger rail transport segment as not being transparent. Likewise, the pricing systems for the use of service facilities do not appear to be transparent enough.

In addition to the pricing systems for access to the railway network, the railway undertakings also criticised the pricing system for traction current. In their comments, they noted that small and medium-sized railway undertakings are placed at a disadvantage vis-à-vis Deutsche Bahn undertakings because they cannot compensate for the annual peak, like DB undertakings can.

The introduction of so-called plant-dispatcher tracks was also criticised. DB Netz AG deploys

plant dispatchers in some service facilities. Plant dispatchers coordinate the use of capacities in service facilities. In the non-scheduled traffic segment, they assign objects no less than 73 hours before their usage begins. The plant dispatcher is the point of contact for parties with access rights, railway undertakings and the relevant offices of DB Netz AG or adjacent infrastructure managers. Service facilities with plant dispatchers have different (flat-rate) usage charges than those that apply in other service facilities. The railway enterprises criticise that the costs incurred are disproportionately high and that third-party railway undertakings are discriminated against.

#### Noise-based track access charges

The Bundesnetzagentur asked the railway undertakings in its annual market survey about their use of “low-noise freight trains”. This set of questions was included in connection with DB Netz AG’s introduction of the noise-based track access charging system when the changeover from the 2013 timetable to the 2014 timetable was made. The objective of the noise-based infrastructure charging system was to promote the use of “lower-noise freight cars” and “lower-noise freight trains”. When at least 90 percent of the freight cars of a freight train have been retrofitted with noise-reducing brakes, the respective railway undertaking received a refund (bonus) in 2016 on the track access charges paid for the freight train.

According to DB Netz AG, “low-noise trains” accounted for 23.4 percent of all train-path kilometres travelled in the rail freight transport segment in 2016. This corresponds to nearly 55 million train-path kilometres.

Based on the market survey conducted by the Bundesnetzagentur, the share of train-path kilometres travelled by “low-noise trains” of

non-federally owned railways significantly exceeded this value.

Approximately 53,000 freight cars with quiet brakes were registered in Germany as of 31 December 2016. Around 23,000 of their freight cars have composite brake blocks, another 29,000 have whisper brakes and a small number have modern disk brakes. As a result, “quiet” freight cars accounted for a good 32 percent of all freight cars registered in Germany. Freight cars from other countries which are already equipped noise-abating brakes also use the German rail network. Consequently, the share of “quiet” freight cars used in Germany is probably considerably larger.

#### Rolling stock

Nearly 13,000 powered railway vehicles were registered in Germany at the end of 2016. These included locomotives, power units, railcars and multiple train units, insofar as they can operate as the smallest unit.<sup>5</sup> The number of powered vehicles therefore continued to grow in 2016. Compared to 2011, over 14 percent more vehicles with their own drive system were registered at the end of 2016.<sup>6</sup>

Figure 23 shows the development of rolling stock during the last six years. All in all, there has been a marked, ongoing increase. However, a breakdown by type of vehicle and drive system reveals significant differences. At nearly 30 percent, railcars and multiple unit trains posted the largest increase during the last six years, followed by electric locomotives with five percent. The number of diesel-powered locomotives increased by a total of 4.6 percent

<sup>5</sup> Not counting the Hamburg and Berlin suburban railways

<sup>6</sup> Source: Federal Railway Authority - National Vehicle Register

between 2011 and 2016. However, this increase was driven solely by mainline locomotives with a maximum speed of more than 100 km/h. Their number increased by nearly 14 percent. By contrast, the stock of smaller diesel-powered locomotives with a maximum speed of less than 100 km/h - which are primarily deployed for shunting services and in the immediate area - declined slightly by one percent.

Steam locomotives led the list of stock reductions in the last six years with a decrease of more than seven percent. The number of electric locomotives with a maximum speed of less than 100 km/h also declined by nearly 14 percent. Both types of locomotive are used almost exclusively for display or museum-related purposes. Due to their age, the number of these vehicles still in existence has been small for some years now. Consequently, a further decline in the number of vehicles in these two categories has no impact on the development of the overall stock of powered vehicles.

The number of various different older electric locomotives with conventional drive systems (commutator) has also declined steadily. This decline has been more than compensated for by commissioning modern electric locomotives with three-phase electric motors.<sup>7</sup> Looking at the entire vehicle fleet with electric drives in Germany (electric locomotives, railcars/multiple train units), more than 70 percent of the electrically powered vehicles were equipped with modern three-phase technology at the end of 2016. The share of vehicles with three-phase electric drive systems grew by more than 47 percent between 2011 and 2016.

As a result of the current development of rolling stock and the concomitant modernisation of the rolling stock fleet, the already environmentally friendly mode of transport "railway" is making progress. The increased use of modern electric vehicles is also reflected in the increased amount of recovered braking energy thanks to the possibility of regenerative braking. For more details, please see the chapter "Electrical traction in the railway market". In the case of diesel-powered locomotives that are used primarily for shunting services and in the immediate area, greater use is being made of vehicles with hybrid systems.<sup>8</sup>

Their numbers have increased to the low double-digit range in the last two years. This type of vehicle therefore represents a share of only one percent at this time. Their growing numbers could however be a sign that the test phase for this type of drive in the railway market has ended.

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<sup>7</sup> Three-phase drive systems make it possible to feed energy recovered by electric brakes back into the grid.

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<sup>8</sup> Hybrid drive: The diesel-powered drive is supported by an electric motor that uses rechargeable batteries.

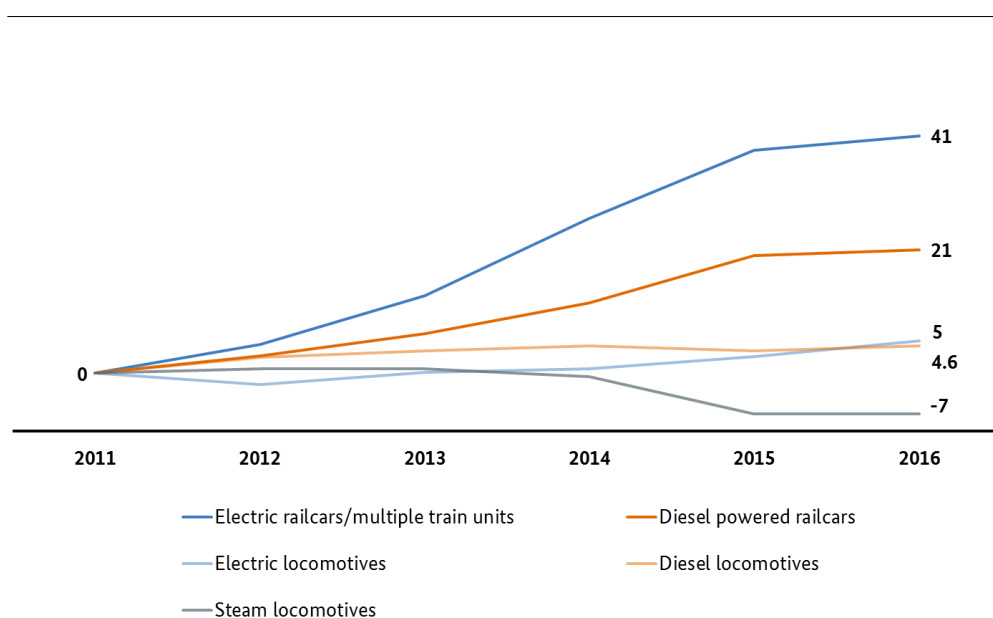


Figure 23: Development of powered rolling stock (2011-2016; change in percent; indexed 2011 = 0)

The share of traditional passenger coaches continued to decline. By contrast, the share of railcars and multiple unit trains grew at an above-average rate. When all of the middle and end cars from the largely multi-unit railcars and multiple unit trains are added together, their total share in the last six years has increased by more than 38 percent to more than 16,000 individual units which are available for passenger transport service.

The number of freight cars reached a total of approximately 165,000 at the end of 2016, a little more than 11 percent more than in 2011. The number of freight cars held by foreign registered users increased by a good 20 percent compared to 2011, to approximately 34,000.



### Change in the traction current market

The last few years have witnessed a variety of changes in the area of traction power which have led in some cases to particular challenges in the railway market. The introduction of a new DB Energie GmbH network access model in 2014 made the systematic application of the rules of the Energy Industry Act possible for the first time. This gave railway undertakings new ways of influencing their energy costs. However, they were confronted even more than in the past with the model for determining charges pursuant to the Ordinance concerning Charges for Access to Electricity Networks ("StromNEV").

As a result of the application of the statutory provisions, the usage pattern of the individual railway undertaking has moved more to the foreground. This has led, on the one hand, to more time spent doing calculations and, on the other hand, to various effects on the expenses of the individual railway undertaking. Some undertakings carried out extensive changes in their organisational structure in order to counter various effects or to make systematic use of the new possibilities offered by the legal regulations. For example, transport services that are to be provided using electrical power were combined under a single railway undertaking licence or, now that it was actually possible, railway undertakings made use of the option of switching to a third-party supplier.

### Renewable energy surcharge payable under the Renewable Energy Sources Act

Even before this extensive change in the traction current market, the amendment of the Renewable Energy Sources Act led to intensive discussion in the railway market starting back in 2013. New provisions which went into effect with Renewable Energy Sources Act in 2014 also led to changes in railway undertakings' costs.

The Renewable Energy Sources Act amended the renewable energy surcharge in 2014, resulting in changes in the legal regulations for railways.

Upon application, railways may limit the level of the surcharge to be paid on traction current they consume to 20 percent of the current renewable energy surcharge. The reduced surcharge for 2016 was approximately 1.27 cents per kilowatt hour. Following the amendment, this limit could be used by any railway that consumes at least two gigawatt hours of traction current a year.

These changes in the special compensation scheme for railways converted the limit on the renewable energy surcharge for eligible undertakings into a percentage of the general renewable energy surcharge. This surcharge is determined every year and has risen almost without interruption since 2003. Under the previous provisions, the amount was fixed at 0.05 cents per kilowatt hour. However, the group of eligible railway undertakings was limited due to the required minimum consumption of ten gigawatt hours per year. Only approximately one-third of the railway undertakings operating in the German railway market could apply these rules back then.<sup>9</sup>

In 2016 approximately three-quarters of the railway undertakings consumed more than two gigawatt hours of traction current and were therefore eligible to claim a reduction in the renewable energy surcharge they had to pay. The majority of the undertakings consuming less than two gigawatt hours either operate in border areas (short-distance passenger rail transport service), conduct special transport services (transfers of rolling stock, measurement and test runs) or organised rides with a historical background (heritage rail travel). The bundling

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<sup>9</sup> For details, please see: Bundesnetzagentur, Railway Market Analysis 2013.

of transport services in order to exceed the two-gigawatt threshold is generally not practised by these undertakings due to their small service volumes. In contrast to the other railway undertakings, they are charged the current, applicable renewable energy surcharge in the full amount for their rail traffic. The full renewable energy surcharge for 2016 was 6.354 cents. This means that these railway undertakings pay approximately 5.08 cents more per kilowatt hour.

#### Electrical traction in the railway market

Being an environmentally friendly mode of transport, the railway provides the bulk of its services with the help of electrical traction. Approximately three-fourths of all rail services provided in Germany are performed with electrical traction.

A special feature of this type of power is becoming increasingly important. Thanks to the use of modern vehicles with three-phase AC drive systems, the railway is the only mode of transport capable of recovering a large part of the energy used during operation by feeding energy back into the grid. In 2016, the amount of energy used totalled approximately 11.9 terawatt hours (TWh). Of this amount, some 1.67 TWh of braking energy were fed back into the traction power network and could therefore be reused. In 2013 approximately 1.27 TWh were recovered and fed back into the grid. The recovery/feed-back rate rose to 14 percent in 2016.

This is due to the increased use of new vehicles with three-phase AC power systems. The new electric railcars and multiple-unit trains used in short-distance passenger rail service had, by themselves, a feedback rate of nearly 30 percent and make a substantial contribution to the

increased feedback rate.<sup>10</sup> Loco-hauled passenger trains posted a much smaller feedback rate of approximately ten percent in long-distance passenger rail transport service; this figure was slightly higher in short-distance passenger rail transport service due to the greater number of stops. The feedback rate in the rail freight transport segment was approximately 11 percent.

The amount of energy needed per train-path kilometre travelled varies, depending on the configuration of the respective train path. In addition to the actual train path configuration, the most important factors here are - in varying degrees, depending on the market segment - the weight of the train, the maximum speed driven and, in the short-distance passenger rail transport segment, first and foremost, the number of stops. For example, a multiple-unit train in the short-distance passenger rail transport segment typically consumes an average of nine kWh per train-path kilometre; this figure is approximately 14 kWh for longer, double-deck trains. Loco-hauled passenger trains in the long-distance passenger rail transport segment need approximately 13 kWh per train-path kilometre travelled. This figure averages about 18 kWh for long-distance freight trains.

The short-distance passenger rail transport segment required more than 5.3 TWh of electricity. All in all, approximately 3.8 TWh of electricity were consumed for freight transport. The shares of the overall traction current market held by the individual categories short-distance passenger rail transport, long-distance passenger rail transport, rail freight transport and other types of transport remained stable.

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<sup>10</sup> For more information about the vehicle trend, please see the chapter "Rolling stock".

## Change of supplier in the traction power network

The possibility of drawing traction current from a third-party provider by changing one's electricity supplier became a realistic option for the first time through the introduction of the new network access model in 2014. A few non-federally owned railway undertakings changed to another supplier immediately. In 2015 and 2016 additional railway undertakings drew their traction current from other suppliers. In 2016 approximately 40 non-federally owned railway undertakings out of a little more than 100 railway undertakings with electrically powered operations drew more than 1.6 terawatt hours of electricity from new providers. Thus more than 16 percent of the traction current in the traction power network was ordered from providers other than DB Energie. Based on the electricity consumed by all non-federally owned railway undertakings - more than 2.2 TWh - 74 percent was drawn from third-party providers.

At total of 11 energy suppliers besides DB Energie operated in the traction current market in 2016. Approximately half of the providers supplied traction current to several railway undertakings. In some cases the railway undertakings were affiliated with the energy suppliers.

## Individual network charges

Since the Energy Industry Act applies to the traction power network, the provisions of the Electricity Network Charges Ordinance (StromNEV) also apply fully. In this connection, the provisions set forth in Section 19 of the Electricity Network Charges Ordinance which govern special types of grid usage are of interest to a number of railway undertakings. Based on these provisions, final consumers can arrange a separate network charge with the grid operator, provided that their peak load will foreseeably deviate significantly from the concurrent annual peak load from all amounts drawn from the grid.

These rules on separate network charges can particularly benefit railway undertakings in the rail freight transport segment. Most of services in this segment are provided outside the peak hours for passenger service. Separate network charges benefit more than one-quarter of the more than 60 railway undertakings in the rail freight transport segment which provide their services entirely or in part using electrical traction. The savings here averaged 1.4 cents per kilowatt hour. Assuming that a long-distance freight train uses an average of 18 kilowatt hours per train-path kilometre travelled, the resultant network charge per train-path kilometre is approximately 25 cents lower. Based on this, railway undertakings in the rail freight transport segment that have arranged separate network charges were able to reduce their costs for traction current by a little more than 11 percent per kilowatt hour on average. In 2016, depending on the amount of electricity consumed and the required peak load during the year, these railway undertakings saved between eight and 15 percent of their traction power costs.

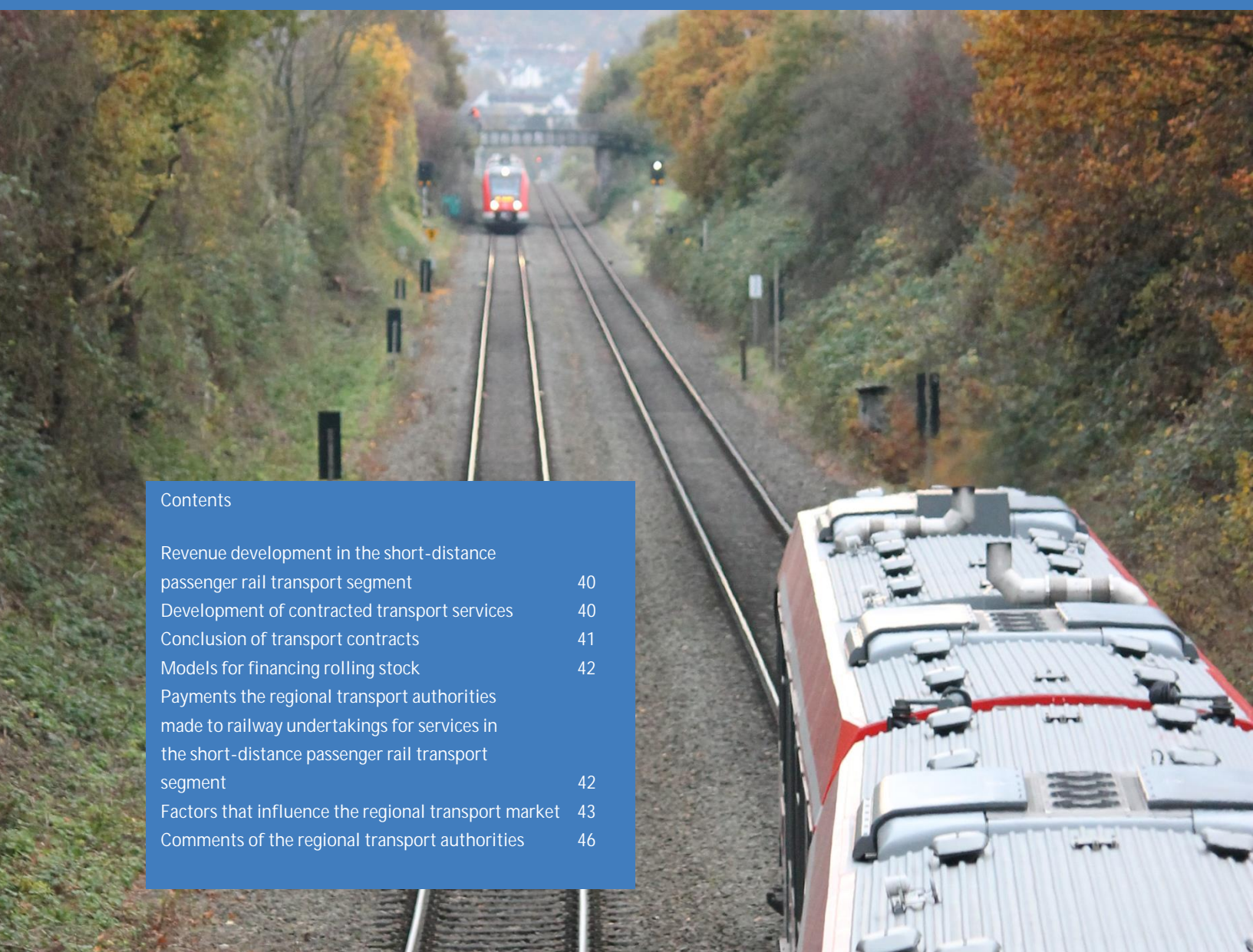


# Financing short-distance passenger rail transport service

Germany's federal states are entitled to receive regionalisation funds from federal tax revenue in order to provide local public transport. The federal states use regionalisation funds to finance short-distance passenger rail transport service.

## Contents

Revenue development in the short-distance passenger rail transport segment	40
Development of contracted transport services	40
Conclusion of transport contracts	41
Models for financing rolling stock	42
Payments the regional transport authorities made to railway undertakings for services in the short-distance passenger rail transport segment	42
Factors that influence the regional transport market	43
Comments of the regional transport authorities	46





## Regional transport authorities and the short-distance passenger rail transport market

The share of the railway undertakings' revenue represented by the subsidies received from the regional transport authorities declined insignificantly over the previous year. The share of transport services that are contracted on the basis of competitive tendering continues to grow. The number of transport contracts concluded by the regional transport authorities remains high.

### Revenue development in the short-distance passenger rail transport segment

The most important sources of revenue for the railway undertakings operating in the short-distance passenger rail transport segment, in addition to market revenue, are public subsidies which bodies (regional transport authorities) contracting short-distance passenger transport services pay to the railway undertakings that have been contracted to provide transport. These subsidies come largely from funds made available by the Federal Government to Germany's *Länder* (federal states) under the Regionalisation Act from 27 December 1993.

Using a breakdown of the revenue components, the following diagram shows the importance of public subsidies for the short-distance passenger rail transport segment. The share of public subsidies remained constant at 60 percent

through the year 2010. Starting in 2011, the share of market revenue began to increase and, as a result, the size of the share of public subsidies declined.

Market revenue (primarily from the sale of tickets) covered a little more than 45 percent of the costs of short-distance passenger rail service in 2016.

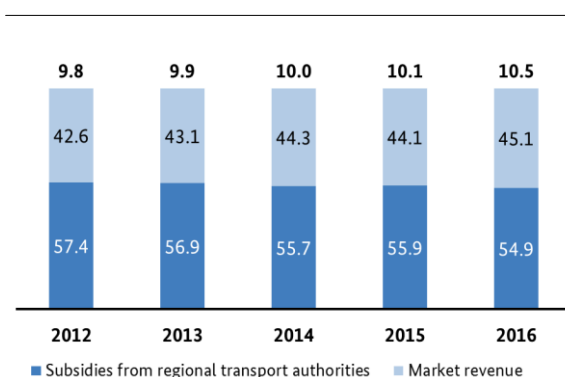


Figure 24: Share of subsidies from regional transport authorities in revenue generated in the short-distance passenger rail transport segment (2012-2016; revenue in € billion; shares in percent)

### Development of contracted transport services

The amount of transport services that the regional transport authorities contracted from non-federally owned railway undertakings in 2016 was eight percentage points more than in 2012.

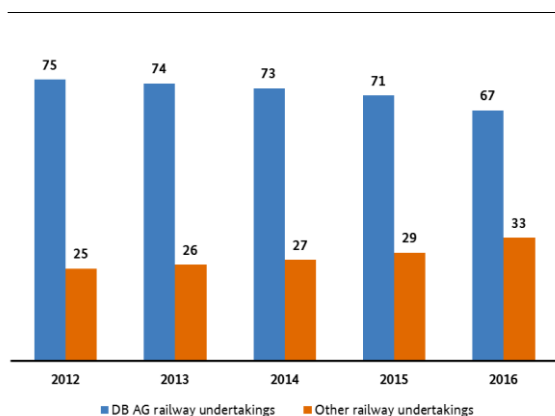


Figure 25: Development of market shares for contracted transport services in the short-distance passenger rail transport segment (2012-2016; shares in percent)

### Conclusion of transport contracts

Regional transport authorities contract railway undertakings to provide short-distance passenger rail transport services. These contracts are largely awarded through tendering. Under certain conditions, particularly in the case of transitional contracts or short-term contracts, tendering was not used as the basis for awarding contracts. The number of transport contracts increased sharply from 2014 to 2015. This was followed by a slight decline to 40 transport contracts signed in 2016. The number of transport contracts concluded in 2017 is expected to rise again in 2017, to 43.

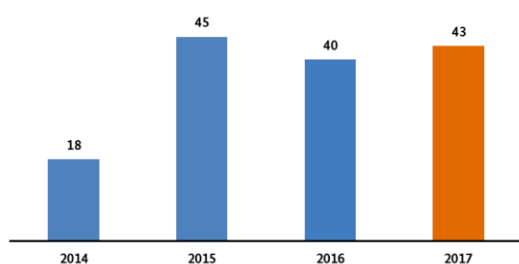


Figure 26: Number of concluded transport contracts and an anticipated number of concluded transport contracts (2015-2016; number)

Tenderers submitted a total of 79 offers for the 40 transport contracts concluded in 2016. This means that approximately two tenderers took part in the respective contract-award procedure.

Of the 40 transport contracts awarded by regional transport authorities in 2016, 31 were awarded by tender and nine were awarded without the use of the tendering process.

In the previous year, 34 contracts were awarded by tender and 11 were awarded without the use of the tendering process.

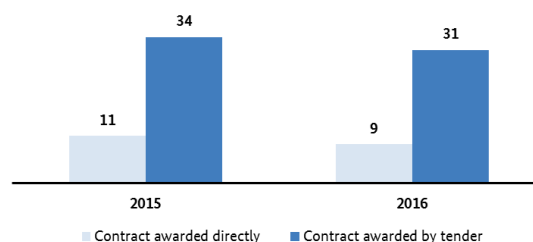


Figure 27: Award of transport contracts by regional transport authorities, by tender and without tendering (2015-2016; number)

Approximately 67 percent of all train-path kilometres provided in 2016 were contracted through the tendering process and slightly more than 33 percent were awarded without the use of tendering. More than 43 percent of the train-path kilometres provided during 2014 were awarded without the use of the tendering process.

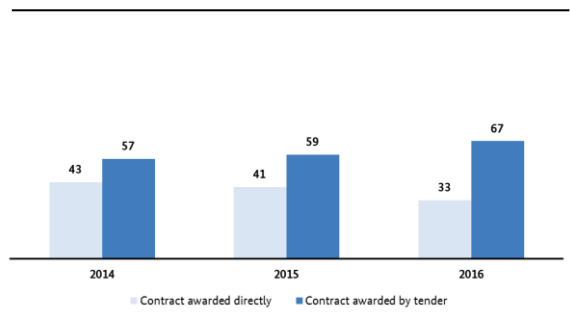


Figure 28: Share of contract-award procedures in the short-distance passenger rail transport segment (2014-2016; shares in percent)

Nine transport contracts were awarded without the use of tendering in 2016. Six of these contracts were awarded to railway undertakings belonging to Deutsche Bahn AG and three were awarded to non-federally owned railway undertakings in the short-distance passenger rail transport segment.

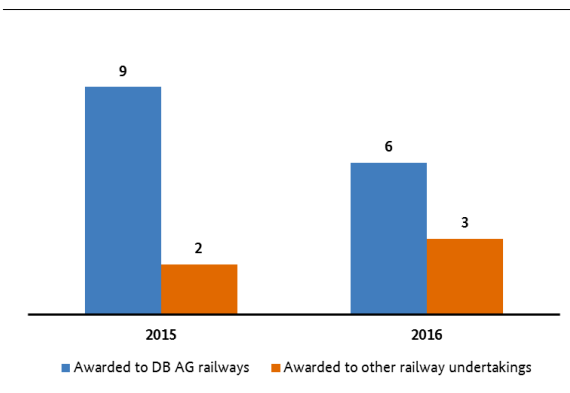


Figure 29: Award of transport contracts by regional transport authorities to railway undertakings, without tendering (2015-2016; number)

Of the 31 transport contracts awarded by regional transport authorities through tendering in 2016, 15 were awarded to Deutsche Bahn AG railway undertakings and 16 were awarded to non-federally owned railway undertakings in the short-distance passenger rail transport segment.

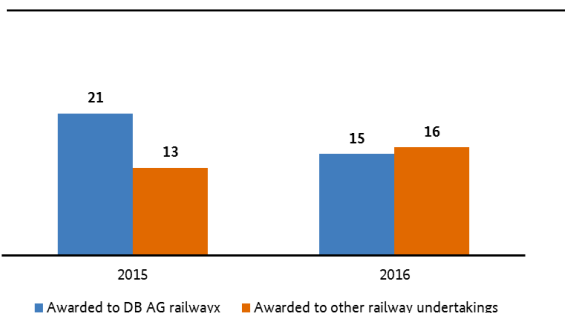


Figure 30: Award of transport contracts to railway undertakings by regional transport authorities by tender (2015-2016; number)

### Models for financing rolling stock

In 14 transport contracts concluded in 2016, the regional transport authorities made an offer to provide assistance with financing rolling stock.

The variants of the rolling stock financing offered in these contracts included debt servicing guarantees, re-use guarantees and the provision of rolling stock through the regional transport authorities via a rolling stock pool.

Special financing models (the RRR-NRW model and the BW model) were offered for five transport contracts. In one case, financing in the form of a leasing agreement was offered, among other things. Here a separate invitation to tender was conducted for the rolling stock.

### Payments the regional transport authorities made to railway undertakings for services in the short-distance passenger rail transport segment

Railway undertakings that operate in the short-distance passenger rail transport segment and accept the regional transit fares in their trains receive a payment from the regional transport authorities. During 2106, these authorities paid more than €19.3 million to railway undertakings for the services they provided in the long-distance passenger rail transport segment. This

figure was slightly more than €8.5 million in the previous year.

Factors that influence the regional transport market

As in past years, the Bundesnetzagentur gave all regional transport authorities participating in its annual survey the opportunity to evaluate and rate market-related aspects on a scale of 1 (very good) to 5 (unsatisfactory).

The regional transport authorities' assessments of short-distance passenger rail transport in 2016 changed only slightly over the previous year. More than 40 percent of the regional transport authorities rated the level of modernisation of the infrastructure as average. A little more than one-third of the regional transport authorities gave this category a bad grade. The average improved slightly compared to the previous reporting period, from 3.2 to 3.1.

The regional transport authorities assigned train-path condition an average rating of 3.1. This rating did not improve over the previous year. A little more than one-third of the regional transport authorities rated this factor with a four or five ("poor").

The regional transport authorities for short-distance passenger rail transport gave the condition of passenger stations an average rating of 3.1 in 2016, the same as in the previous year.

Their rating of the level of modernisation of passenger stations averaged 2.7, an improvement over the previous year. Approximately half of the regional transport authorities gave this factor a rating of 3.0.

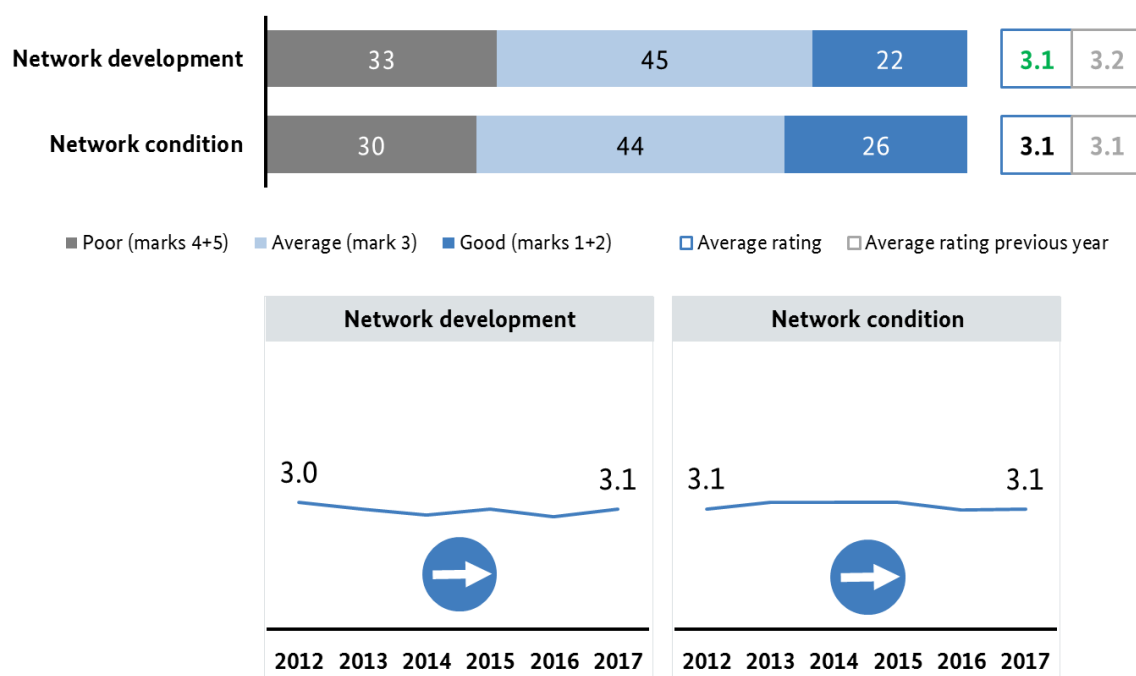


Figure 31: Ratings for train-path condition and development assigned by regional transport authorities for short-distance passenger rail transport (2012-2017)

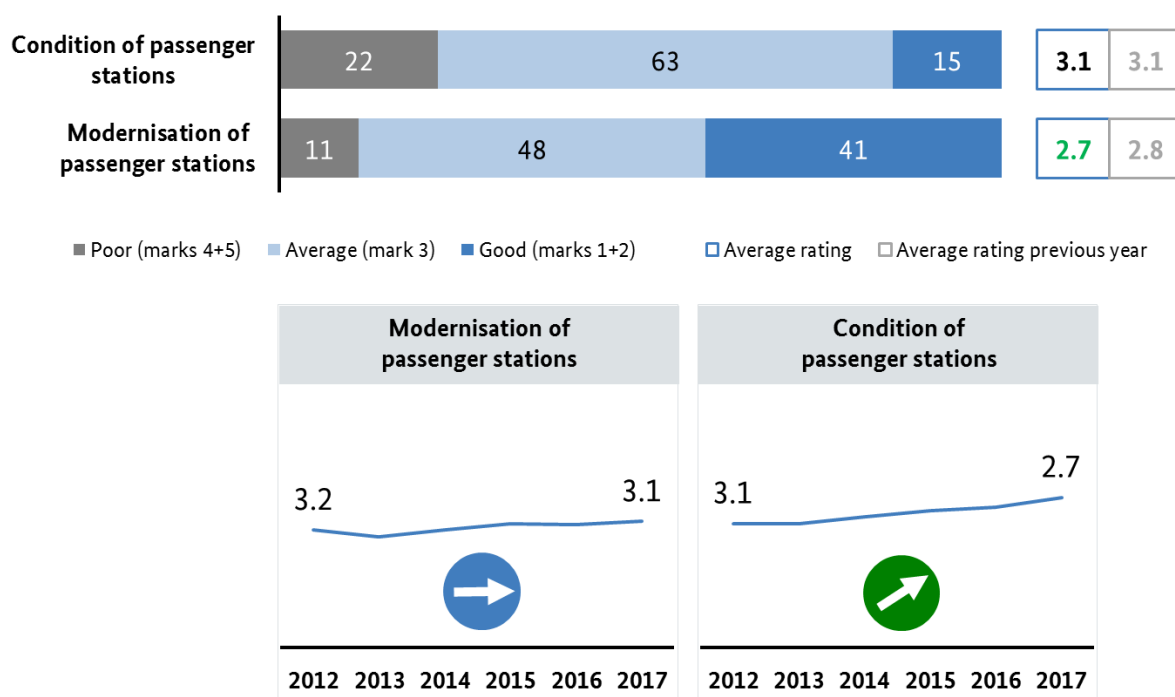


Figure 32: Ratings for the development and condition of passenger stations and stopping points assigned by regional transport authorities for short-distance passenger rail transport (2012-2017)



The regional transport authorities gave a rating of 2.9 to issues pertaining to the level of non-discrimination in the railway undertakings' pricing systems for stations. This was slightly worse than in the previous year. The regional transport authorities gave an average rating of 2.6 for the level of non-discrimination in track access charge systems. This represents a slight improvement over the previous reporting period.

Looking at stations, the regional transport authorities gave the infrastructure managers' price-performance ratio a rating of 3.4. They assigned a 3.7 just the year before. The infrastructure managers' price-performance ratio for train paths received a rating of 3.4 from the regional transport authorities, better than in the previous year.

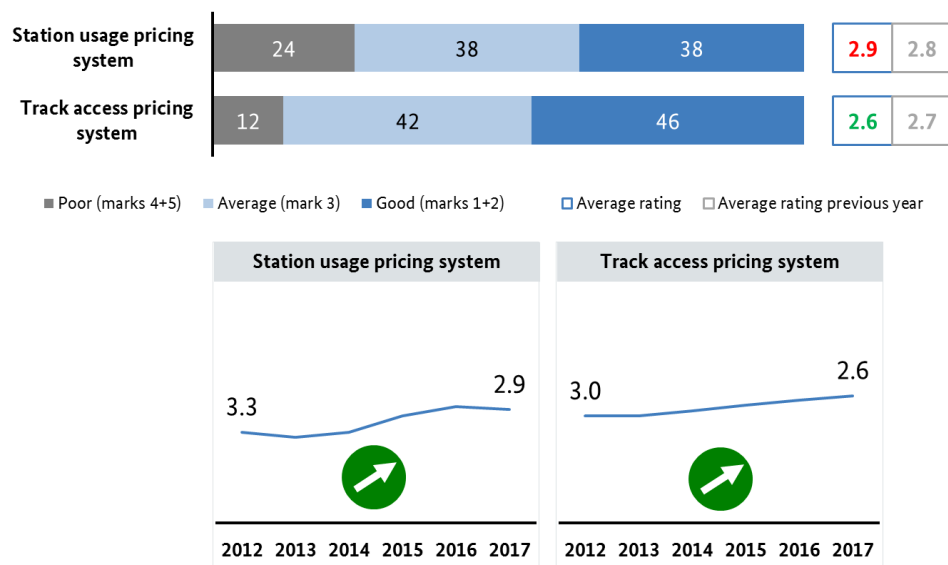


Figure 33: Regional transport authorities' ratings of the level of non-discrimination in the infrastructure managers' pricing systems (2012-2017)

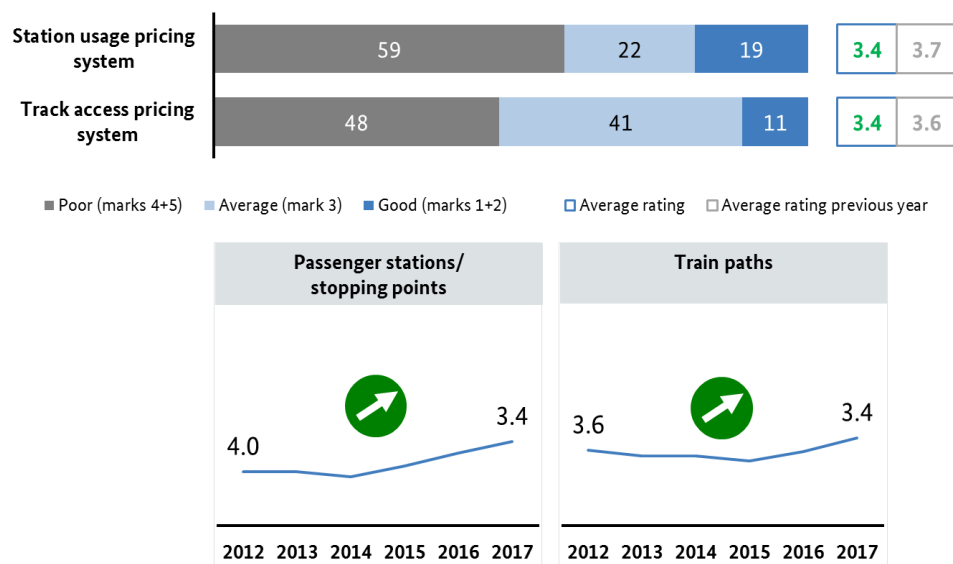


Figure 34: Regional transport authorities' rating of the infrastructure managers' pricing systems (2012-2017)

Comments of the regional transport authorities

As part of the annual market survey, the Bundesnetzagentur gives the regional transport authorities the opportunity to provide recommendations, tips and requests for its future regulatory work. They can also provide comments, tips and information about their own experience relating to access to the railway infrastructure market.

#### General issues

In the “general issues” category, the regional transport authorities would like to see Germany’s federal states have a voice with respect to the more efficient use of funds provided through the Federal Railway Infrastructure Upgrading Act. Further, they said DB Netz AG should bear the follow-on costs arising from construction measures (for example, due to the use of replacement bus service).

#### Train paths

Looking at the issue of train paths, the regional transport authorities would like support for integrated regular interval timetables. Further, incentives must be created to encourage additional orders in the train access charge system, based on the marginal cost pricing approach for additional train paths. In addition, unjustifiably long or short-notice line closures should be reviewed.

#### Stations

Looking at stations, the regional transport authorities expect a transparent account of the pricing and cost increases for the railway undertakings and regional transport authorities. They also indicated that Deutsche Bahn infrastructure managers should be more service-oriented vis-à-vis local authorities. Examples cited included local measures in the vicinity of

train stations, particularly when DB must acquire land.

#### Personnel

Looking at the subject of personnel, the regional transport authorities stated that DB companies should hire more administrative personnel.

#### Passengers

In their comments on this point, the regional transport authorities demand that passenger interests be treated as a priority.

#### Conclusion of contracts for supplementary services

In this area, the regional transport authorities advocate that the Bundesnetzagentur weighs in, within the framework of its possibilities, on the subject of contracts for supplementary services. The reason for this is that DB Station&Service AG is playing with its cards very close to its chest regarding the services that will not be included in the future basic budget that is to be extended and increased by 1.8 percent.

#### Framework agreements

Here the regional transport authorities stated that the discontinuation of framework agreements would place short-distance transport service at a disadvantage.

#### Construction measures

In this area, the local transport authorities stated that appropriate railway infrastructure ought to be made available when construction measures are sizable or will take a longer time to complete. Crossovers and the corresponding signalling equipment are urgently needed for long, single-track sections so that cumulative headway delays do not snowball. There is also a need for action in connection with timetables during construction projects and with additional costs for construction or maintenance work.

# Provision of infrastructure

Regulation in the railway sector that is required by law is aimed at enterprises in the railway infrastructure market. This regulation ensures non-discriminatory access to railway infrastructure in Germany for all railway undertakings.



## Contents

Infrastructure managers	48
Revenue development among infrastructure managers	48
Trend in operating performance	49
Network statements for railway infrastructure	49
Charge schedules	50
Ratings for access to railway infrastructure	51
Maintenance facilities	56
Factory railways	57

## Railway infrastructure market

The revenue generated by infrastructure managers continued to rise in 2015. The number of train-path kilometres travelled increased over the previous year.

### Infrastructure managers

For its annual market survey, the Bundesnetzagentur gathered data from approximately 150 infrastructure managers, around 500 service facility operators and more than 200 operators of factory railways for the 2016 reporting year. Many of the infrastructure managers operate service facilities as well.

The number of infrastructure managers contacted for the survey increased significantly over the previous year due the Bundesnetzagentur's greater market penetration.

There is still no central register for railway infrastructure that covers all infrastructure managers. In addition, a licence is not required to operate most service facilities. In light of this, it must be assumed that the Bundesnetzagentur does not have a comprehensive overview of the railway infrastructure market in some segments.

According to data currently available to the Bundesnetzagentur, German infrastructure managers operate routes totalling some 39,100 kilometres with a track length of approximately 60,700 kilometres (excluding tracks in service facilities). Tracks with a total length of approximately 11,000 additional kilometres are operated in service facilities.

### Revenue development among infrastructure managers

The infrastructure managers generated their revenues primarily from the charges they collected for the use of train paths and service facilities. At approximately €5.0 billion, track access charges accounted for approximately 80 percent of total revenue from infrastructure usage in 2016.

Looking back at recent years, this represents a steady increase in the revenues generated from usage charges. This figure has grown from €5.5 billion in 2012 to a total of €6 billion in 2016. This is equal to an average annual increase of somewhat more than three percent.

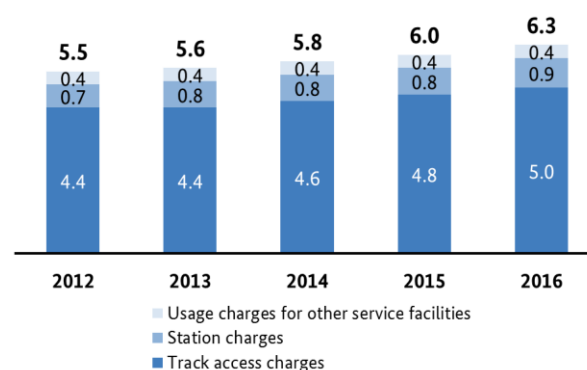


Figure 35: Revenue generated from usage charges in the railway infrastructure market (2012-2016; € billion)



Approximately two-thirds of total revenue from track access charges is generated in the short-distance passenger rail transport segment. The remaining portion comes from charges paid in the long-distance passenger rail transport segment and in the rail freight transport segment. For years, short-distance passenger rail transport accounted for a steadily growing share of the infrastructure managers' revenues from track access charges. However, this share has stagnated since 2014.

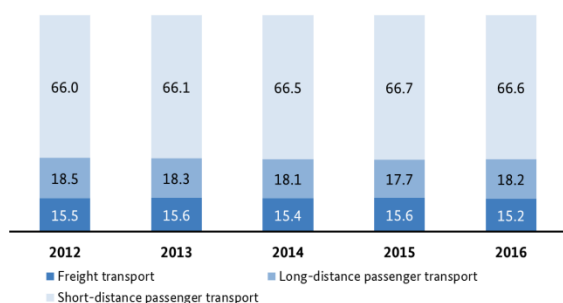


Figure 36: German infrastructure managers' total revenue from track access charges, broken down by type of service (2012-2016; in percent)

#### Trend in operating performance

The number of kilometres travelled in Germany's public railway network increased once again after 2015 and totalled some 1,098 million train-path kilometres in 2016, a new record. This figure has increased steadily since 2014. The number of train-path kilometres exceeded the one billion mark for the first time in 2004.

The number of train-path kilometres travelled in the rail freight transport segment did not exceed the level reported in the previous year. However, both short-distance and long-distance passenger rail transport posted increases. The short-distance passenger rail transport segment set a new record with 689 million train-path kilometres.

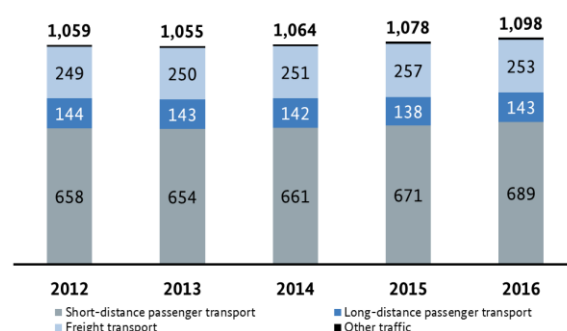


Figure 37: Development of train-path kilometres, broken down by type of service (2012-2016; million train-path kilometres)

Transport services are provided largely using Deutsche Bahn AG railway infrastructure. Depending on the type of transport service, the railway infrastructure of other operators accounts for only two to three percent. The average traffic density on non-federally owned railway infrastructure is approximately one-fifth (infrastructure managers with primarily passenger service) or approximately one-thirtieth (infrastructure managers dealing primarily with freight transport) of the traffic density seen in connection with federally owned railway infrastructure.

#### Network statements for railway infrastructure

Rail infrastructure managers are required by law to provide all parties with access entitlement access to their infrastructure under non-discriminatory terms and conditions. Under certain circumstances however, the Rail Regulation Act which went into force in September 2016 provides for the possibility of limiting free access, such as in the area of factory railways (Section 15 of the Rail Regulation Act).



The terms for using railway infrastructure that has been made available for use are to be drawn up in the form of network statements for railway infrastructure and as service facilities statements for service facilities. Before they can go into effect, they are reviewed by the Bundesnetzagentur to ensure that they conform to the law; they take effect only after the Bundesnetzagentur confirms their conformity with the legal requirements. The Bundesnetzagentur assists infrastructure managers to ensure that the statements they develop are in conformity with the law.

In 2016, 97 percent of the infrastructure managers and 75 percent of the service facility operators had network statements or service facilities statements. Publication rates are 94 percent and 66 percent respectively (Figures 38 and 39). The decline seen in the area of service facilities is due to the fact that more respondents participated in the survey (improved level of market penetration).

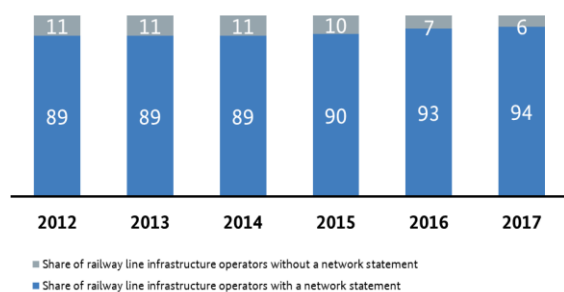


Figure 38: Share of infrastructure managers that have published a network statement (2012-2017; in percent)

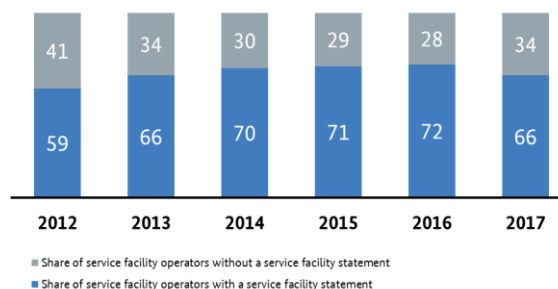


Figure 39: Share of service facility operators that have drawn up a network statement for service facilities (2012-2017; in percent)

Infrastructure managers that have been exempted from the requirement to draw up network statements have not been included in the shares calculated here. Some of the remaining companies are still in the process of drawing up their network statement.

### Charge schedules

Infrastructure managers are required to draw up and publish schedules of their charges for the services they provide. Service facility operators are likewise required to draw up schedules of their charges. Although these operators are not required to publish the schedules of their charges, transparency certainly fosters acceptance among prospective customers.

A total of 84 percent of the infrastructure managers had drawn up and published corresponding schedules of their charges (Figure 40).

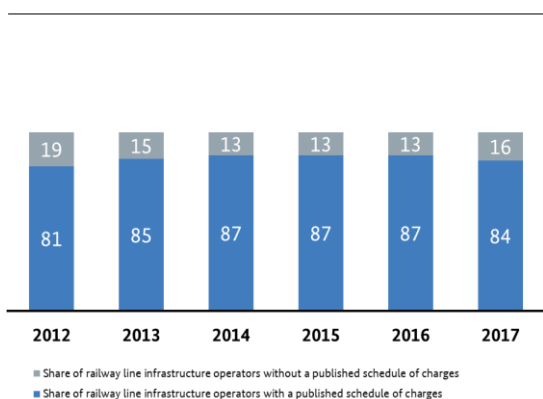


Figure 40: Share of infrastructure managers that have published schedules of their charges (2012-2017; in percent)

The share of service facility operators that had drawn up schedules of their charges fell to 64 percent in 2017 (Figure 41). This is a reflection of the survey's increased level of market penetration. By comparison, 47 percent of the service facility operators have published their schedules of charges, the same level seen in the previous year.

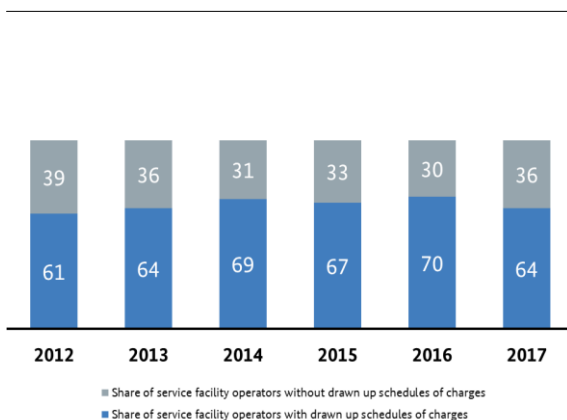


Figure 41: Share of service facility operators that have drawn up schedules of their charges (2012-2017; in percent)

## Ratings for access to railway infrastructure

Every year, as part of its regular survey, the Bundesnetzagentur gives all parties with access right the opportunity to evaluate and rate market-related aspects on a scale of 1 (very good) to 5 (unsatisfactory). Here the Bundesnetzagentur surveys not only railway undertakings but also the regional transport authorities that task railway undertakings with providing transport services in the short-distance passenger rail transport segment. The market findings for the regional transport authorities are summarised in Chapter 4, starting on page 40.

In the current survey, there were only slight changes over the previous year in most thematic areas. Once again however, the areas "non-discriminatory pricing systems", "access to service facilities" and "access to train paths" - all of which are regulated by the Bundesnetzagentur - received the highest ratings, alongside "IMs' customer friendliness".

The area "price-performance ratio of IMs" was the only area to receive just a "satisfactory", repeating the results from the previous year. The criticism from the railway undertakings focused primarily on the areas "tariffs and sales", "network development / condition" and "international access".

Looking at access to railway infrastructure, railway undertakings gave both train-path allocation and railway timetable quality good ratings on average.

However, compared to the previous year, the railway undertakings were overall somewhat more critical in their rating of access to train paths. A slight year-on-year decline can be observed in the ratings in nearly all categories. Their criticism of construction site planning was particularly harsh.

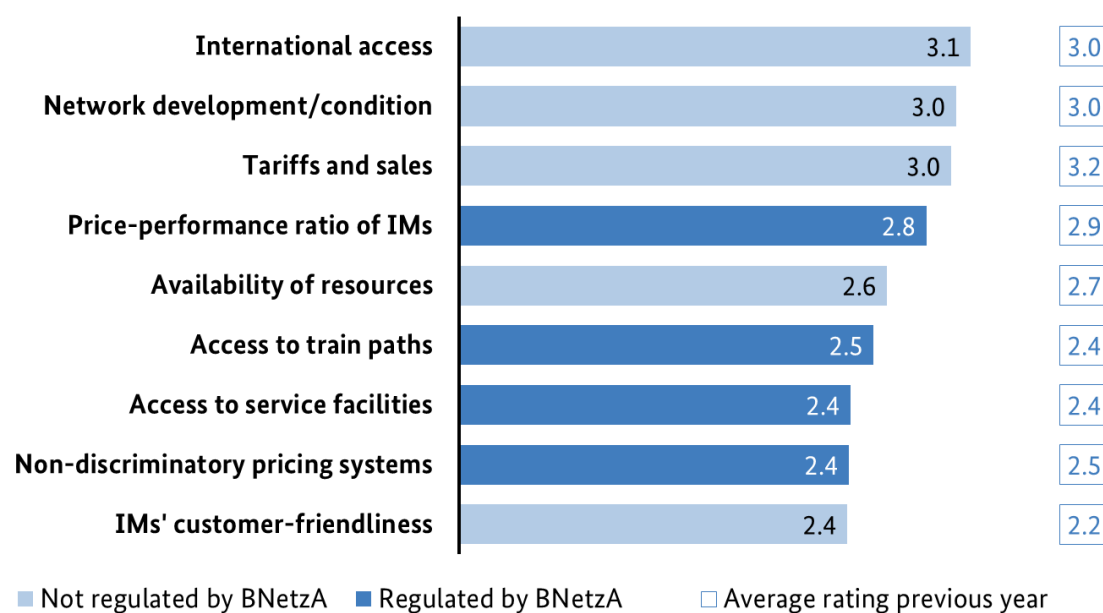


Figure 42: Factors that influence the railway market (2017; average values)

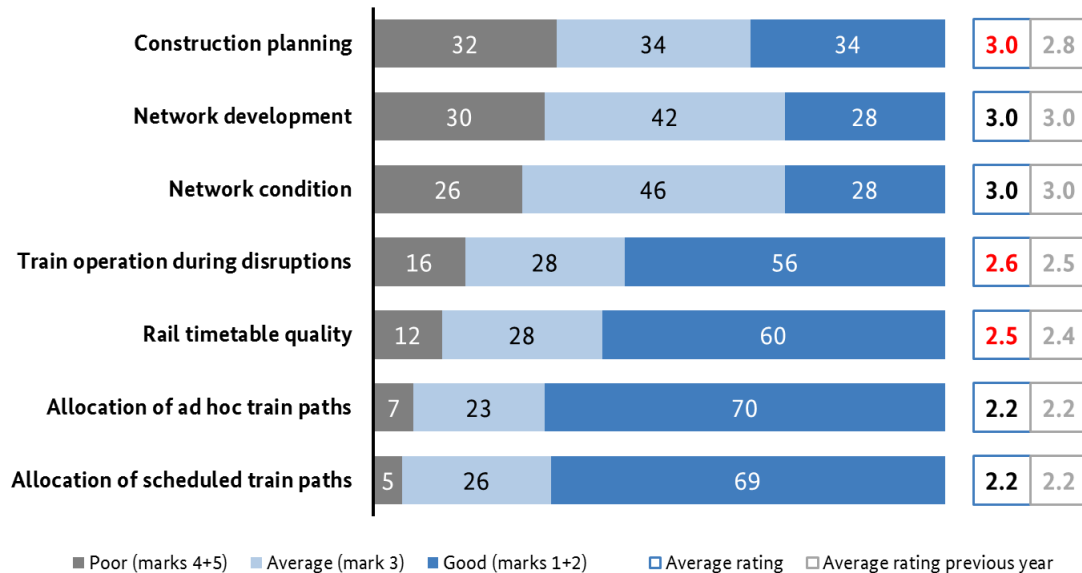


Figure 43: Ratings given for track access (2017; rating shares in percent and average marks)

More than half of the railway undertakings taking part in the survey rated arrangements for train operation during disruptions as “good” or “very good”. Nonetheless, the railway undertakings submitted a large number of comments indicating difficulties with the scheduling of traffic in individual cases (see problems from the perspective of parties with access right in the chapter “Railway Transport Market”).

The market players’ assessment of the quality of coordination in the infrastructure managers’ construction site planning fell off significantly and is now 3.0. This was probably due not only to various aspects of how construction measures are coordinated but also to the increased number of construction measures.

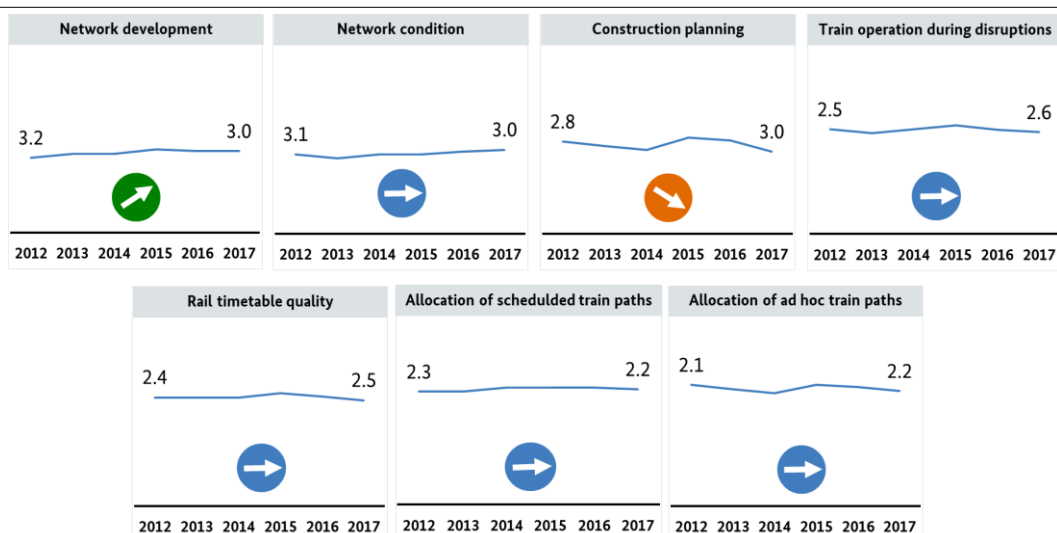


Figure 44: Trends in the ratings given for areas pertaining to train paths (2012-2017)

Most of the railway undertakings surveyed also see an urgent need for improvement in the condition and development of the railway network infrastructure. They assigned a rating of 3.0 for this area, the worst in this group of issues (Figure 43).

There was no significant change in the ratings the railway undertakings have given to the area “track access” in recent years.

From the railway undertakings’ point of view, there has been overall a noticeable improvement in access to services facilities since regulation began. The marks they gave this issue in the current reporting period were almost all good.

Only the area “access to storage sidings” was rated with just “satisfactory” (2.8). This area was given only average ratings during the time from 2012 to 2017. Nearly one out of every six railway undertakings assigned “access to storage sidings” a rating of only “poor” or “inadequate”.

The best ratings - 2.1 - were given for “training facilities” and “access to passenger stations and stopping points”. Three out of every four participating railway undertakings rated access to these facilities as good or very good.

In the area of service facilities, the condition and modernisation of passenger stations - two aspects that are particularly important in connection with passenger contact - once again received considerable criticism. The railway undertakings’ ratings - 2.9 for the condition of passenger stations and 2.8 for the level of modernisation of passenger stations - were significantly more negative than for access-related issues.



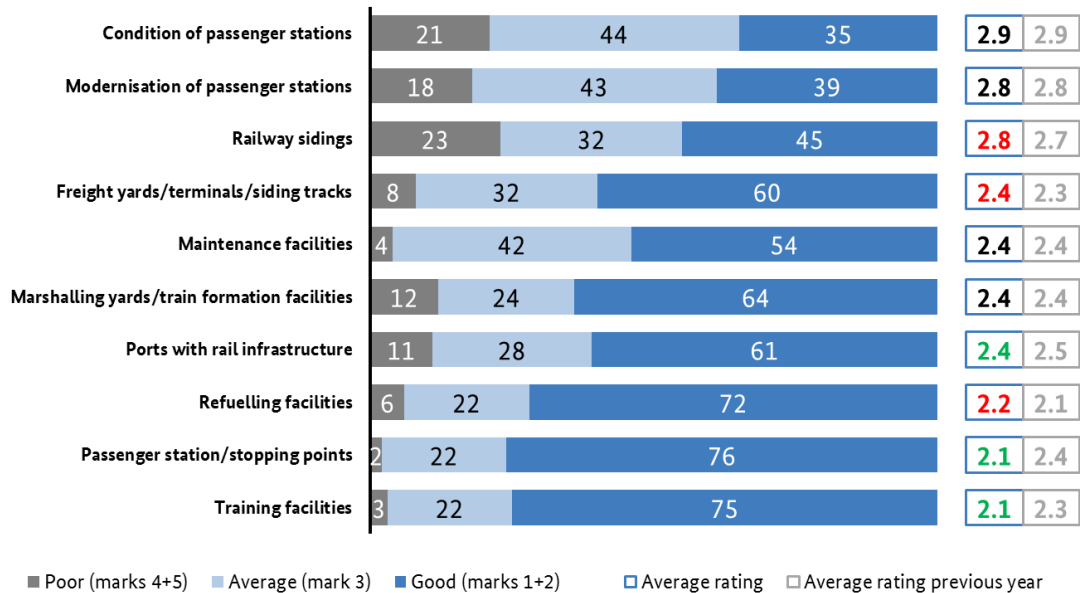


Figure 45: Ratings for access to service facilities (2017; rating shares in percent and average marks)

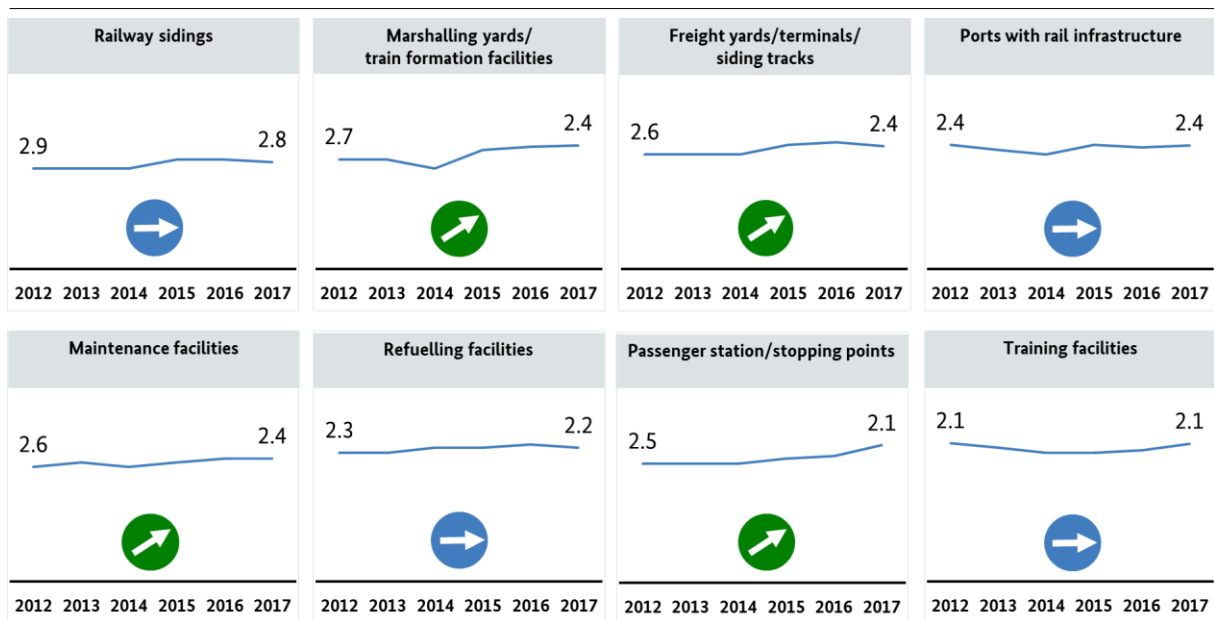


Figure 46: Trends in the ratings given for areas pertaining to service facilities (2012-2017)

Maintenance facilities

Regular maintenance is of crucial importance for the safe and reliable operation of rolling stock. Maintenance services are provided in maintenance facilities which are categorised as service facilities. One hundred and eighty-three of the approximately 500 service facility operators covered by the Bundesnetzagentur's survey operate a total of 340 maintenance facilities with about 20,000 employees. Deutsche Bahn AG subsidiaries operate approximately one-third of these facilities with more than 15,000 employees.

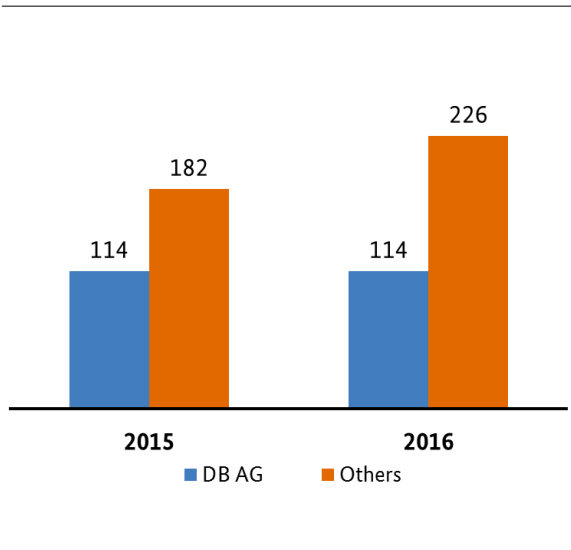


Figure 47: Maintenance facilities for the maintenance and repair of rolling stock (2015-2016; number)

The recorded volume of the market for maintenance and repair services totals approximately €3 billion. Add to this the by no means insignificant volume of maintenance and repair services many operators provide for their own rolling stock and do not report as revenue.

As Figure 48 shows, more than half of the surveyed undertakings (64%) maintain and repair diesel locomotives in their maintenance facilities. Less than one-fourth maintain and repair electrically powered locomotives. One out of every two undertakings maintains and repairs freight cars. This figure is one out of every four for passenger coaches. In addition, there are 149 train wash facilities in operation throughout the country for cleaning the exterior of rolling stock.

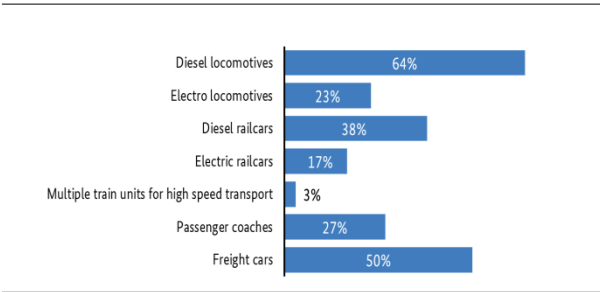


Figure 48: Maintenance services provided by enterprises, by type of rail vehicle (2016; percent; multiple answers allowed)

Approximately two-thirds of all maintenance facilities covered as part of the market analysis as required by Section 64 of the Rail Regulation Act (see the Bundesnetzagentur's report on the segmentation of the markets for railway maintenance facilities ("Bericht der Bundesnetzagentur zur Segmentierung der Märkte für Wartungseinrichtungen für Eisenbahnen") are working at up to more than 80 percent capacity. Looking at maintenance facilities that provide difficult maintenance and repair services, more than three-fourths report working at least 80 percent capacity. Only four percent of all maintenance facilities covered by the survey report working at less than 50 percent capacity.

## Factory railways

Provisions for factory railways were included in the amendment of the General Railway Act which went into force on 2 September 2016 and the Rail Regulation Act which went into effect at the same time. Under Section 2(8) of the General Railway Act, factory railways are railway infrastructure which is operated exclusively for the respective company's own freight transport activities.

Factory railways may be used only for intra-plant transport or for the receipt and delivery of freight by rail for the company that operates the railway infrastructure as well as for other companies that are affiliated with it under corporate law. Factory railway infrastructure may also be used to conduct transports for railways connected to it or for companies bordering it, and occasionally or to a limited extent for other uses.

The rules governing access to factory railways are defined in Section 15 of the Rail Regulation Act. Under this provision, a factory railway operator may reserve the right to conduct transports on the railway infrastructure it operates, or on parts of it, or to have such transports conducted by a railway undertaking it contracts accordingly. When a factory railway operator contracts a railway undertaking to conduct its transports for it, it must notify the undertakings bordering the railway infrastructure of this in writing or electronically. In addition, the factory railway operator must ensure that these transport services are provided on the basis of reasonable, non-discriminatory and transparent conditions.

Under Section 15(1) of the Rail Regulation Act, the operator of a factory railway may terminate access to the railway pursuant to Section 15(2) of the Act at the beginning of a working timetable period.

The areas of focus in the 2017 market survey included the number of private siding tracks, number of factory railway sites and the planned status for the 2018 working timetable period. The market survey covered somewhat more than 200 factory railway operators with approximately 400 private siding tracks.

Around 80 percent of the approximately 200 factory railway operators said that they will be closed during the 2018 working timetable period. A few reported that only a certain part of their railway infrastructure is available to the public.



## Price trends

Operating within its statutory framework, the Bundesnetzagentur reviews the charges which railway undertakings have to pay infrastructure managers for access to railway infrastructure. The following chapter examines these charges from the market perspective.

### Contents

Level and development of track access charges	60
Level and development of station charges	62
Rating and development of pricing systems	63



## Infrastructure access charges

The steady rise in track access and station usage charges is having a significant impact on railway undertakings' business operations.

Infrastructure managers incur costs in connection with the operation and maintenance of railway infrastructure. They pass these costs on - in the form of infrastructure access charges - to railway undertakings and other parties with access right when they use this infrastructure. Given that railway undertakings together have to spend approximately one-third of their revenue on usage charges, the level of these charges represents one of their largest cost factors.

Within the scope of its legal obligations and discretion, the Bundesnetzagentur reviews the infrastructure managers' pricing systems and in many cases has already achieved improvements to the benefit of the parties with access right. Reliable, non-discriminatory access rules and usage charges that are viable in the market are essential factors for ensuring that rail transport can hold its own in the face of intermodal competition.

### Level and development of track access charges

As a rule, track access charges payable to infrastructure managers must be based on the costs incurred in connection with operating and maintaining the track infrastructure. These charges can vary greatly, depending on the operating density and general condition of the railway infrastructure.

In the longer term, maintenance measures (such as bridge restoration) can have a strong influence on the level of usage charges.

Important cost factors include not only the usage profile, age, level of modernisation and condition of the railway infrastructure but also topographical features (bridges/tunnels, costly routing).

Public funding accounts for a significant part of the financing of the transport infrastructure in Germany. Consequently, in the case of necessary infrastructure measures, for example, public funding can be the factor that decides whether the railway infrastructure continues to exist.

The weighted arithmetic mean of the track access charges that infrastructure managers levied in 2016 was €4.57 per train-path kilometre. This was approximately three percent more than in the previous year. The median increased slightly to €4.71 per train-path kilometre. This means that nearly half of the infrastructure managers charged less than the average track access charge of €4.57 per train-path kilometre.

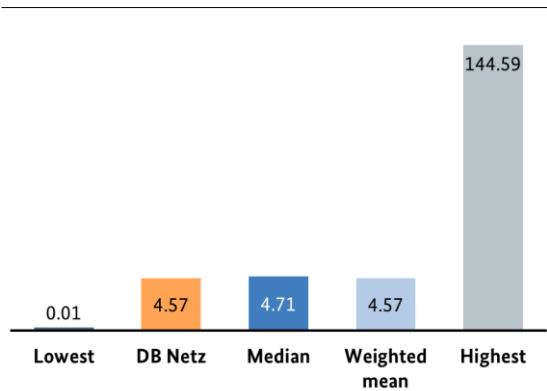


Figure 49: Range of the average track access charges (2016; euros per train-path kilometre)

The track access charges of non-federally owned infrastructure managers whose infrastructure is used primarily or exclusively for rail freight transport are significantly higher than the average. The weighted average charge by this group of undertakings is more than €14.43 per



train-path kilometre. The primary reason for this is most probably this railway infrastructure's comparatively low level of track utilisation.

The weighted average track access charge of non-federally owned infrastructure managers whose infrastructure is used primarily or exclusively for passenger rail transport service is €4.42. This is less than the overall average.

Track access charges have increased steadily over the last five years. Between 2012 and 2017, the track access charges railway undertakings had to pay increased by more than 16 percent in the long-distance passenger rail transport segment, by approximately 14 percent in the short-distance passenger rail transport segment and by a little more than 12 percent in the rail freight segment. These increases are markedly higher than those for important benchmark indicators such as the consumer price index or the producer price index for industrial products. The consumer price index rose by only five percent while the producer price index for industrial products actually fell by two percent during the reporting period.

The typical cost structure of an infrastructure manager can be reproduced more precisely by combining publicly available indices of the Federal Statistical Office instead of using universal indices.

The “infrastructure managers’ input price index” increased from 2012 to 2017 by six percent, once again following the development of the consumer price index relatively closely.

Track access charges in the short-distance passenger rail transport segment in 2016 averaged €4.84 per train-path kilometre. Track access charges in the long-distance passenger rail transport segment were significantly higher. Here the average charge was €6.33 per train-

path kilometre. In the rail freight segment, railway undertakings had to pay an average of €2.97 per train-path kilometre.

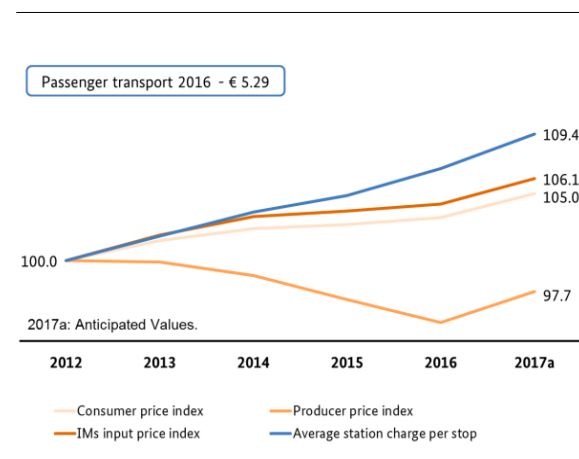


Figure 50: Development of the infrastructure managers' average track access charges (2011-2017a; "a" – anticipated values; indexed 2012 = 100)

The prices for some of DB Netz AG's most frequently requested train-path products have risen by between 44 and 57 percent. This corresponds to an annual inflation rate of between 2.5 and 3.0 percent.

A track access pricing system with a new structure will go into effect at DB Netz AG in 2018. Due to the different structure, direct comparisons with the current system will not be possible. The Bundesnetzagentur examined the new charges very closely and approved them only after a number of adjustments had been made.

Level and development of station charges

The operators of passenger stations charged an average of €5.29 per station stop in 2016. At €2.63 per stop, the median is significantly less. Thus one out of every two passenger station operators charges parties with access right less than €2.63 per station stop on average. Many non-federally owned operators of passenger stations run basic stations. DB Station&Service AG on the other hand also operates significantly larger train stations with more extensive fittings and facilities. Correspondingly, its average station charge (€5.66) is somewhat higher than the overall average and markedly higher than the median.

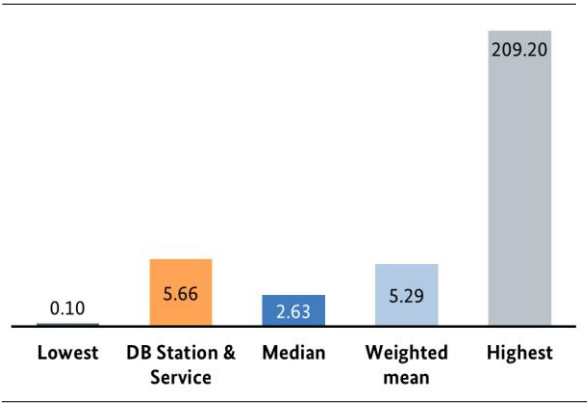


Figure 51: Range of average station charges (2016; euros per stopping point)

The charges levied for train stops at passenger stations have also steadily increased, parallel to the trend seen in track access charges. The Bundesnetzagentur expects the average station charge to have increased by slightly more than nine percent during the period from 2012 to 2017. During the same period, important benchmark indices indicate growth rates of five to six percent. Producer prices fell by two percent.

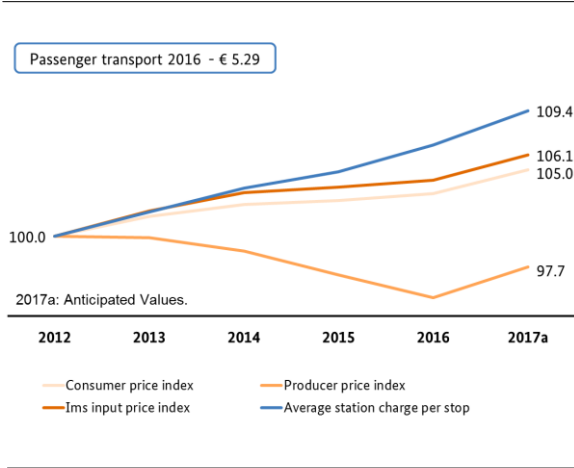


Figure 52: Development of the average station charge (2012-2017a; "a" – anticipated values; indexed 2012 = 100)

## Rating and development of pricing systems

As part of the Bundesnetzagentur's annual market survey, railway undertakings have the opportunity to rate not only the level of non-discrimination but also the price performance of the infrastructure managers' pricing systems.

In recent years, the ratings for all of the points pertaining to the level of non-discrimination in the pricing systems have improved, in some cases significantly.

This area received good overall ratings in the individual subcategories for the first time ever in this year's survey. Participating railway undertakings saw the greatest year-on-year improvements in the area of traction current charge systems. This issue, along with the subject of maintenance facilities, received the best ratings.

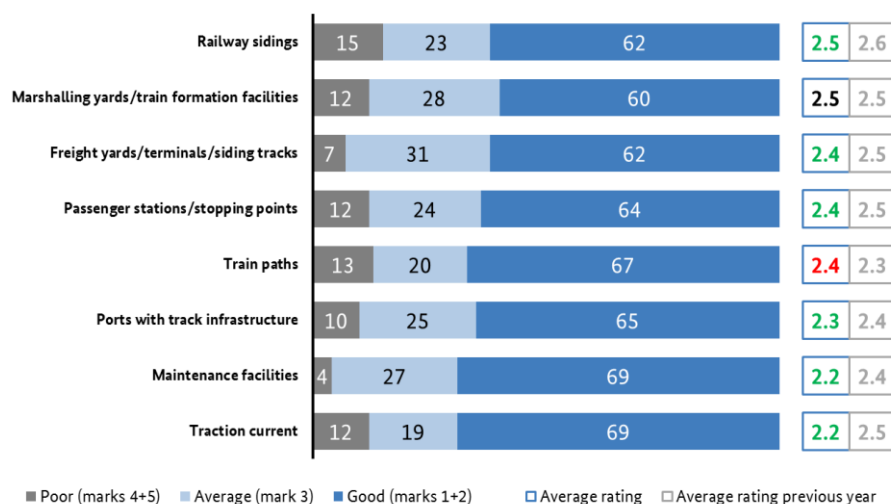


Figure 53: Ratings for the level of non-discrimination in IMs' pricing systems (2017; ratings shares in percent and average values)

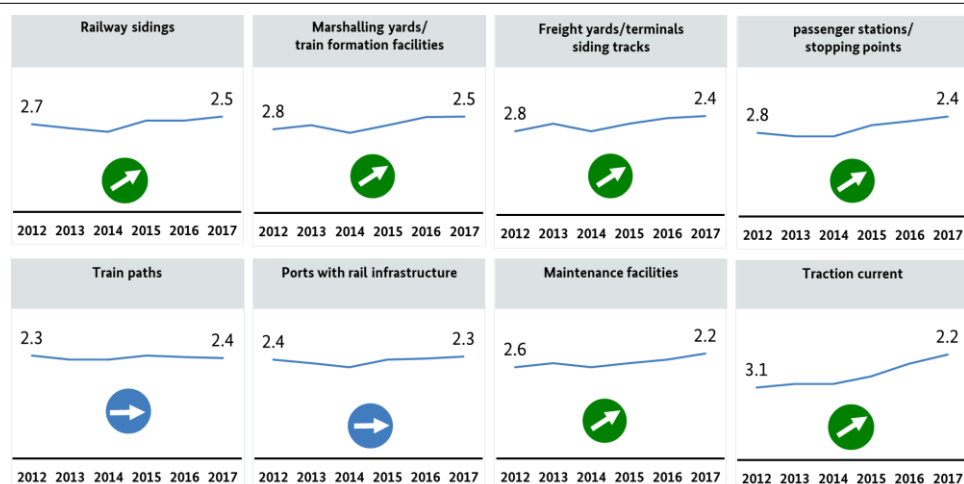


Figure 54: Development of the ratings for the level of non-discrimination in the infrastructure managers' pricing systems (2012-2017)

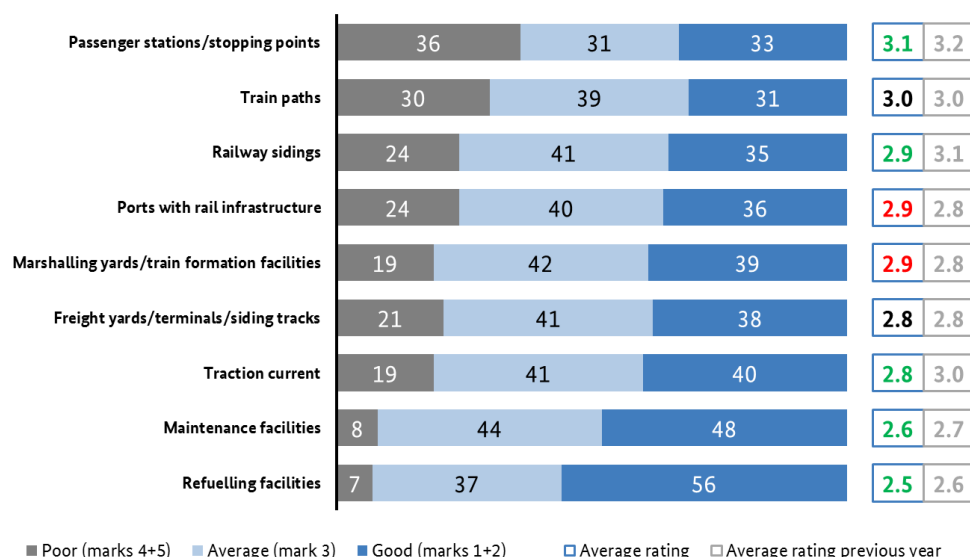


Figure 55: Infrastructure managers' price-performance ratio (2017; rating shares in percent and average values)

The railway undertakings rated the infrastructure managers' price-performance ratio as satisfactory. Here too, there were in some cases significant improvements in the ratings assigned by the railway undertakings.

Viewed over a longer period, the ratings for price performance have, in many cases, improved gradually only in recent years. In this area, parties with access right continue to see the greatest potential for improvement with respect to points that are subject to regulation.

Railway undertakings continue to see the greatest deficits in the relationship between the prices charged and the services provided for passenger stations (mark: 3.1), tracks (3.1), ports (3.0) and storage sidings (mark: 3.0).

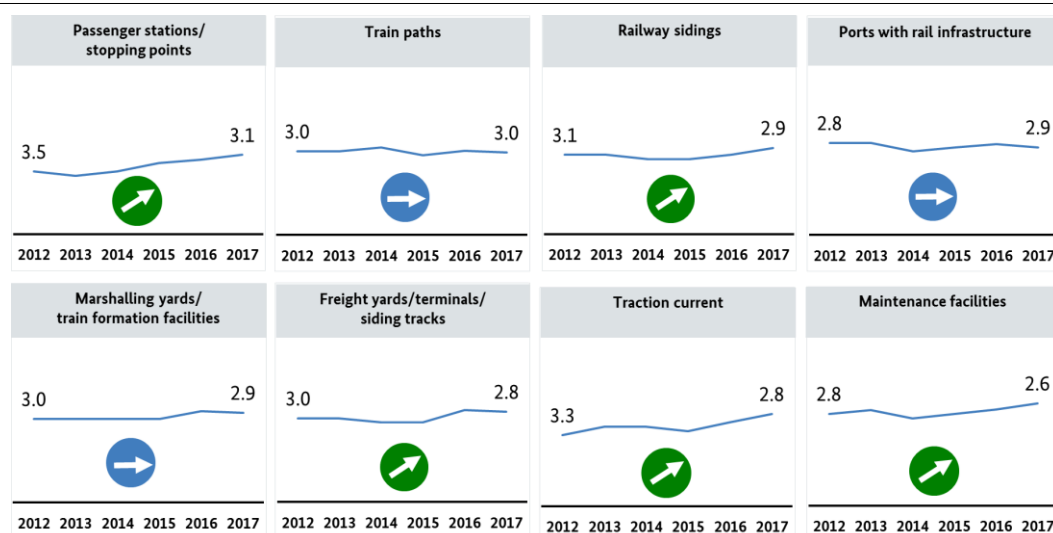


Figure 56: Development of the infrastructure managers' price-performance ratios (2012-2017)



# Cost development and results situation of the railway undertakings

The Bundesnetzagentur monitors the economic situation of enterprises operating in the railway market. As part of these activities, it examines company-specific developments and developments over specified periods of time.

## Contents

Results situation of railway undertakings	66
Profit margin of the railway undertakings	69
Infrastructure access charges as a percentage of railway undertakings' revenue	70
Results situation of non-federally owned infrastructure managers	72
Results situation of non-federally owned service facility operators	73
Funding	73

Economic situation of enterprises operating in the railway market

In 2016, the economic situation of companies operating in the rail transport market stagnated at approximately the level of the previous year.

The Bundesnetzagentur has asked railway undertakings and infrastructure managers since 2012 to provide it business information which it then compiles and presents for the previous three years. For these analyses, the Bundesnetzagentur uses only the feedback it receives; it conducts a plausibility check on it. It must be borne in mind however that not all railway undertakings had completed their annual financial statements before the date on which the market survey was conducted. For the analyses of specific individual segments, only those undertakings that operate exclusively in the particular segment were included in the calculations.

Results situation of railway undertakings

A total of 76 percent of the railway undertakings surveyed reported positive operating results for the year 2016. This is a positive development compared to last year's 69 percent. Nonetheless, one-fourth of the railway undertakings did not generate enough revenue to cover their costs in their core business during the reporting year.

Marked differences can however be seen in the detailed examination of the individual transport services in Figure 57. The situation for enterprises in the short-distance passenger rail transport segment is particularly striking. A little more than half of these undertakings were able to report positive operating results. This share increased from 53 percent in 2015 to 55 percent in 2016.

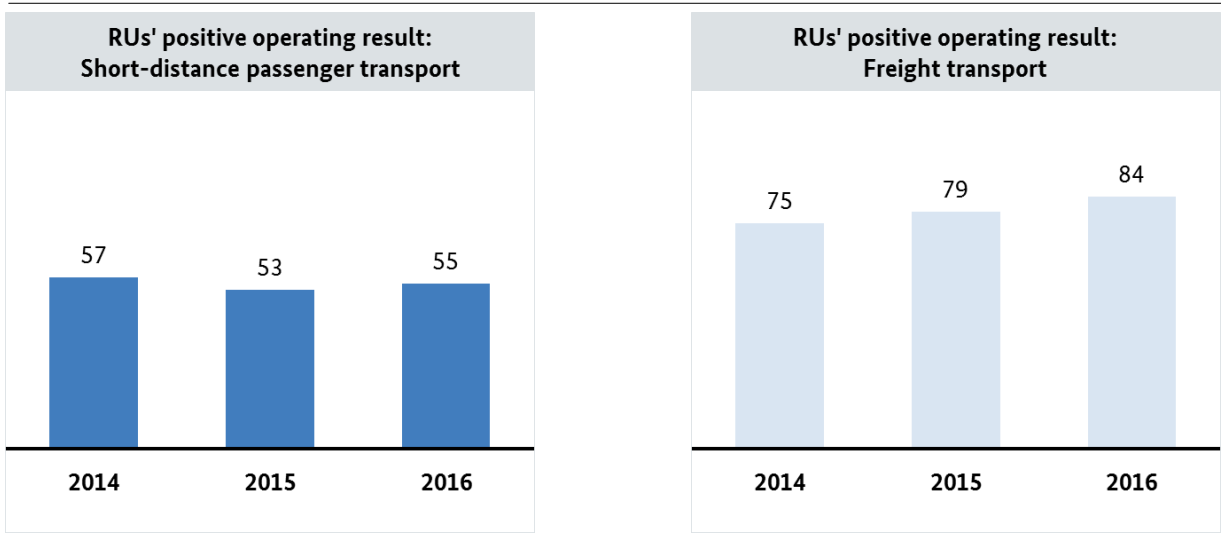


Figure 57: Market overview of railway undertakings' operating results in short-distance passenger rail transport and rail freight transport (2014-2016; shares in percent)



Based on train-path kilometres travelled, these 55 percent of the undertakings account for 72 percent of the market. This 55 percent also includes all federally owned enterprises. Unfortunately, a number of larger competitors were unable to generate a positive result in their core business segment.

The situation was different in the rail freight segment. Here, 84 percent of the enterprises generated positive results, an increase over the previous year. However, enterprises that did not produce positive results accounted for 58 percent of the train-path kilometres travelled. This situation is also related to the loss of DB Cargo AG. For this reason, when all railway undertakings are taken into account, the rail freight segment reported a negative overall operating result.

The stagnation seen in the overall market situation is reflected in the range of the individual operating results (Figure 58). The best positive operating result in 2014 was €503 million. This figure fell significantly to €393 million in 2015. At €397 million, the best positive operating result during the 2016 reporting year was slightly higher once again. At the same time, the maximum loss climbed to -€223 million. This figure had been -€221 million in the previous financial year. Despite the large range in the individual results, the average profit calculated on the basis of all enterprises - €7 million - and the average loss - -€7 million - have remained relatively stable for several years now.

All in all, it can still be said that the enterprises' economic situation is acceptable. However, federally owned enterprises accounted for 89 percent of the positive operating results seen for all railway enterprises and types of transport services examined here.

To provide a better basis for comparing the results situation in the individual transport segments, the operating results were calculated based on the individual measure of performance (Figure 59). Train-path kilometres and passenger kilometres (short-distance passenger rail transport, long-distance passenger rail transport) or tonne-kilometres (rail freight transport) were used as the respective unit of measure.

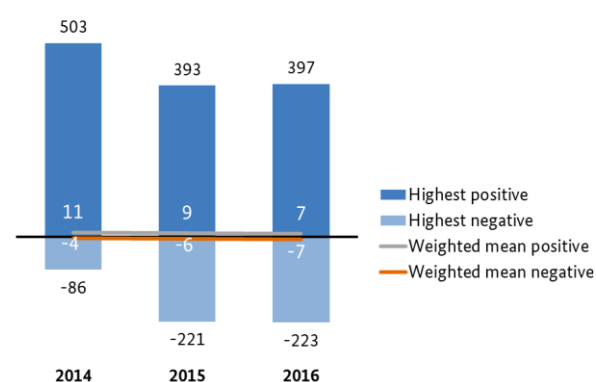


Figure 58: Range of railway undertakings' operating results (2014-2016; in € million)

The result per passenger-kilometre in the short-distance passenger rail transport segment has exhibited a downward trend over the last several years. In addition, non-federally-owned undertakings generated a marked loss of -0.25 cents per passenger kilometre. Overall, short-distance passenger rail transport service continues to generate a better result per passenger kilometre than its counterpart, long-distance passenger rail transport service.

Looking at train-path kilometres travelled, the long-distance passenger rail transport segment generated a result of €1.22 per train-path kilometre in 2016, once again more than the results in the short-distance passenger rail transport segment where this figure fell to €0.89.

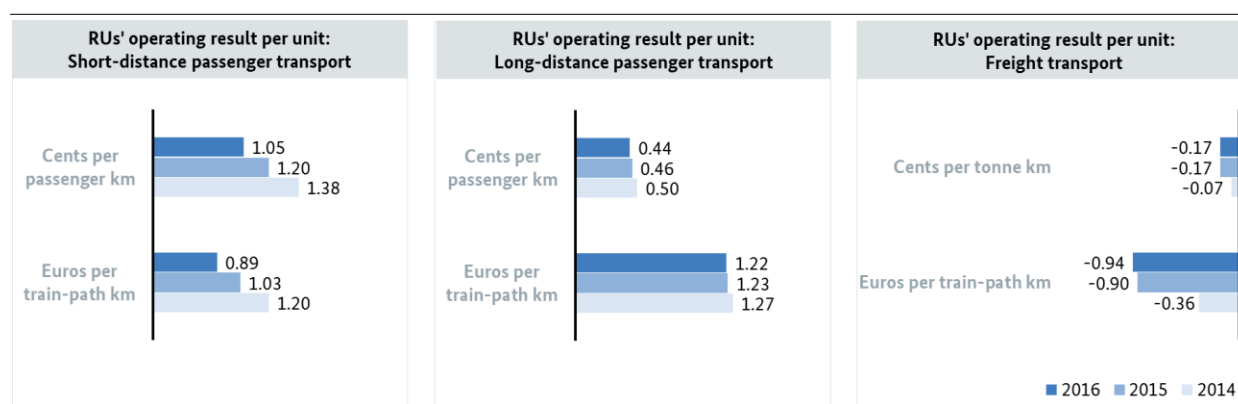


Figure 59: Operating result per passenger-kilometre/tonne-kilometre, by type of transport service (2014-2016; in cents/euros)

In the rail freight transport segment, railway undertakings reported negative operating results - also with a downward trend - in terms of both train-path kilometres and tonne-kilometres. By contrast, when non-federally owned undertakings are examined separately, this group of undertakings generated a positive operating result of 62 cents per train-path kilometre and 0.09 cents per tonne-kilometre. This was more than in the previous two years.

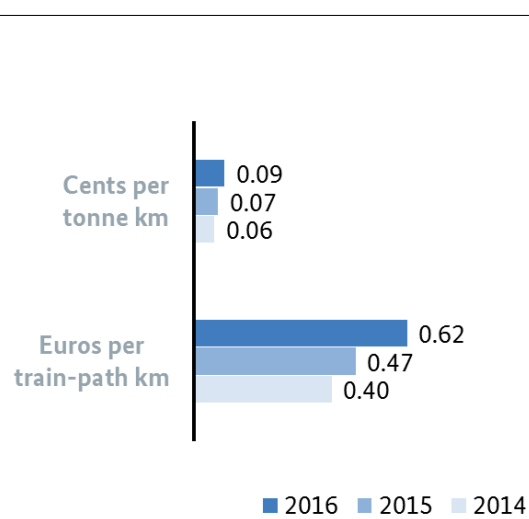


Figure 60: Operating result per train-path-kilometre/tonne-kilometre for non-federally owned railway undertakings in the rail freight transport segment (2014-2016; in cents/euros)

### Profit margin of the railway undertakings

The Bundesnetzagentur uses the enterprises' profit margin as the basis for calculating the economic efficiency of railway undertakings (Figure 61). The profit margin is calculated using the ratio of profit to revenue. It shows how much an enterprise actually earns, measured in relation to its revenue.

The size of the railway undertakings' profit margin varied greatly between the individual transport segments.

Most notably, the profit margin in the short-distance passenger rail transport segment once again saw a significant decline compared to previous years. By comparison, the profit margin posted in the long-distance passenger rail transport segment declined only slightly. The profit margin in the rail freight transport segment continues to be clearly in negative territory. However, the undertakings in this segment could reduce their loss per euro of generated revenue slightly compared to the previous year.

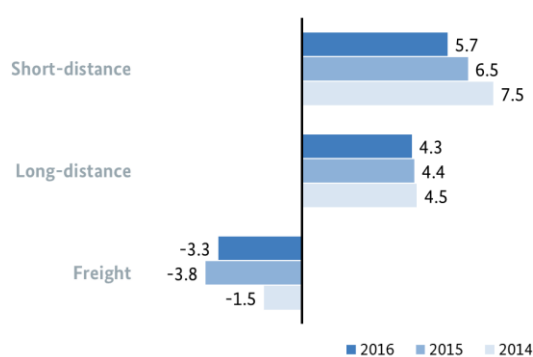


Figure 61: Railway undertakings' profit margins (2014-2016; in percent)

The profitability lead seen in the short-distance passenger rail transport segment was due primarily to federally owned enterprises. By contrast, non-federally owned enterprises generated on average a loss of 1.3 percent per euro revenue.

A detailed analysis of the rail freight transport segment reveals a contrast to the picture seen for rail passenger transport. Non-federally owned railway undertakings in the rail freight transport segment reported, as a whole, a positive profit margin of 4.1 percent in 2016 (Figure 62). The profit margin of federally owned enterprises however pulls the overall figure into negative territory.

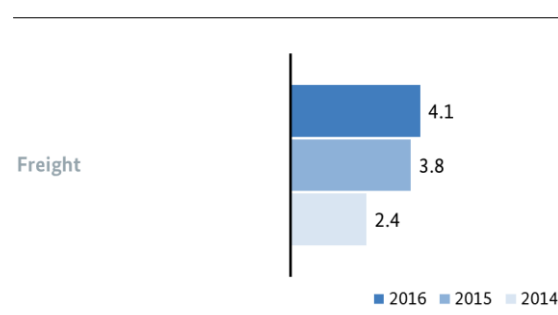


Figure 62: Profit margins of non-federally owned railway undertakings in the rail freight transport segment (2014-2016; in percent)

Infrastructure access charges as a percentage of railway undertakings' revenue

Placing infrastructure access charges in relation to total revenue (Figure 63) reveals marked differences between the individual types of service.

Infrastructure access charges accounted for the largest share of revenue: 39 percent in the short-distance passenger rail transport segment which has reported moderate but steady growth over the years.

At 25 percent, the share in the long-distance passenger rail transport segment was markedly lower but has remained quite stable over the years. By contrast, the share of revenue generated through infrastructure access charges in the rail freight transport segment has steadily declined over time. It was only 17 percent in 2016.

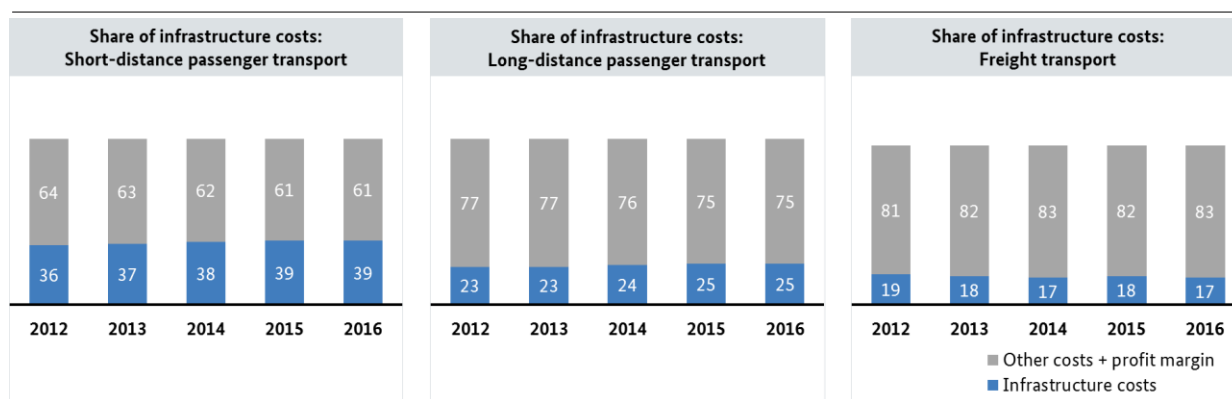


Figure 63: Share of infrastructure access charges as a percentage of railway undertakings' revenue, by mode of transport (2012-2016; shares in percent)

A further breakdown of the infrastructure usage charges paid shows that track access charges constituted the largest share of the infrastructure access charges for all transport services: between 76 and 88 percent. Station charges accounted for 18 percent of the infrastructure access charges paid by short-distance passenger rail transport services due to their greater use of stations. By contrast, this figure was only eight percent in the long-distance passenger rail transport segment. Charges for other service facilities were of secondary importance in the passenger rail transport segment.

Charges for other types of service facilities particularly made a difference in the rail freight segment where they represented 24 percent of infrastructure access charges paid. This is due first and foremost to this segment's greater use of marshalling yards, storage sidings and similar infrastructure. Service charges for other service facilities were of secondary importance in the passenger rail transport segment.

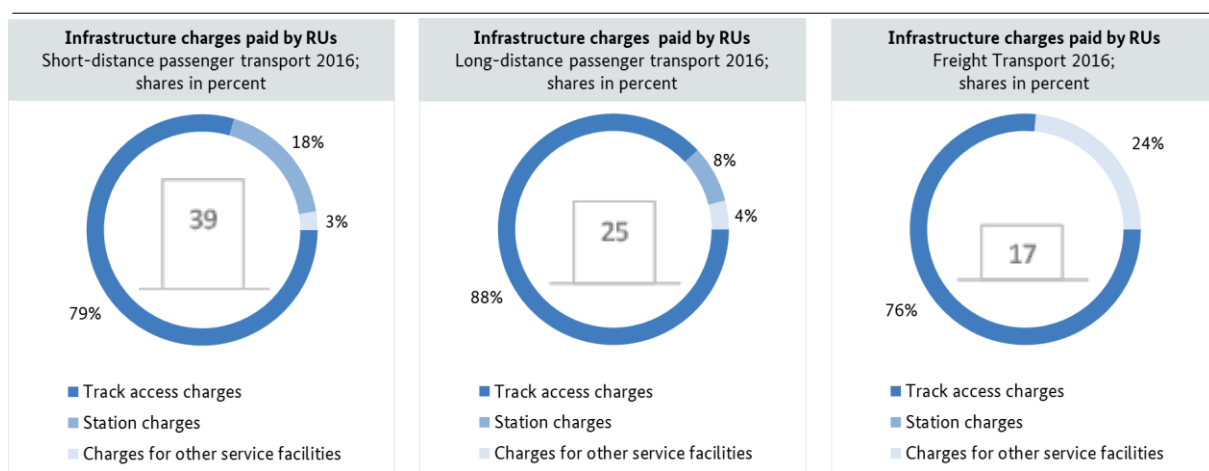


Figure 64: Breakdown of the infrastructure access charges of the railway undertakings (2016; shares in percent)

Results situation of non-federally owned infrastructure managers

As in the previous year, the managers of non-federally owned railway infrastructure continued to expend more on infrastructure than they generated through track access charges (Figure 65).

Short-distance passenger rail transport is the source of most - 82 percent – of the revenues generated from track access charges. Rail freight transport accounts for the other one-fifth.

At 34 percent, material expenditure and other expenditure are the largest blocks of expenses, followed by personnel costs (21 %). Depreciation is also included in total expenditure and represents a smaller share, 11 percent.

Looking at financing, it was noted that at 35 percent, the average own-funds ratio of the non-federally-owned infrastructure managers was slightly less than the own-funds ratio of the overall market's average of approximately 36 percent.

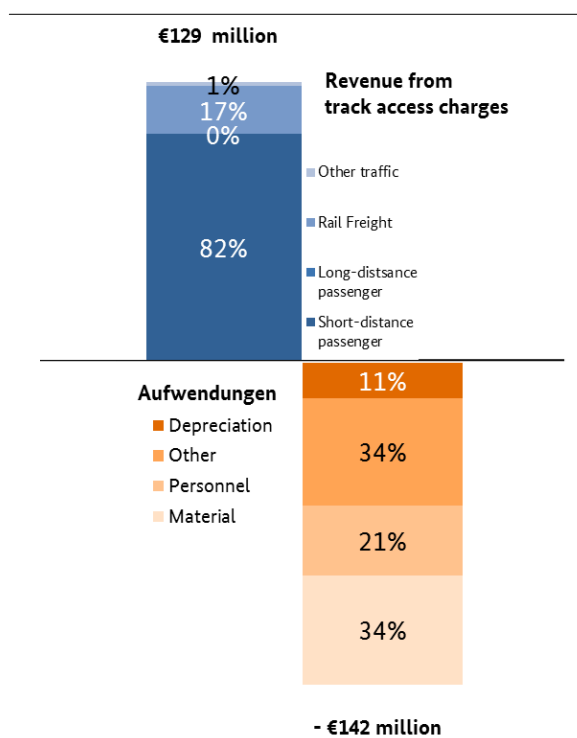


Figure 65: Revenue and expenditure of non-federally owned infrastructure managers (2016; shares in percent)



### Results situation of non-federally owned service facility operators

Once again, the results situation of non-federally owned service facility operators deteriorated slightly during the last business year.

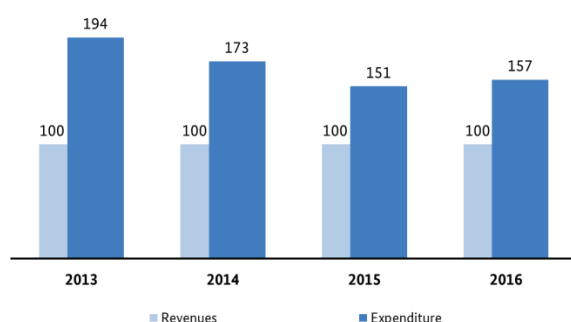


Figure 66: Development of revenue and expenditure of non-federally owned service facility operators (2013-2016; in percent)

Expenditure for maintenance, depreciation and the operation of service facilities continues to exceed the revenue generated from the charges for use of the infrastructure. At 57 percent, the shortfall in 2016 was somewhat larger than during the previous year when it reached 51 percent.

It can generally be assumed that the function of many non-federally owned service facilities is simply to support the respective company's primary business purpose, similarly to non-federally owned infrastructure managers. Therefore not every enterprise is geared to generating a profit. In many cases, railway operations do not constitute a core business activity for these enterprises. Therefore any shortfalls are offset by other business units.

### Funding

In 2016, the infrastructure managers surveyed reported that they had received approximately €3.3 billion in external funding to invest in existing infrastructure. They also reported spending €78 million of their own funds for this. All in all, some €3.4 billion were invested in existing infrastructure. The federally owned infrastructure managers are required under the Service Level and Funding Agreement to contribute funds of their own to investments in existing infrastructure.

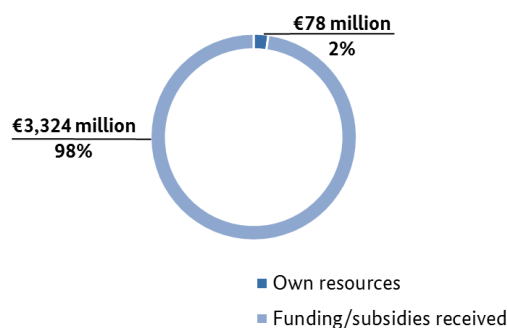


Figure 67: Investment in infrastructure, broken down by own resources and subsidies (2016; in million euros; shares in percent)

They invested €2.3 billion in external funding and more than €0.6 billion of their own resources in the new construction, modernisation or expansion of infrastructure. The enterprises surveyed invested a total of nearly €3 billion to construct, modernise or expand the infrastructure (Figure 68).

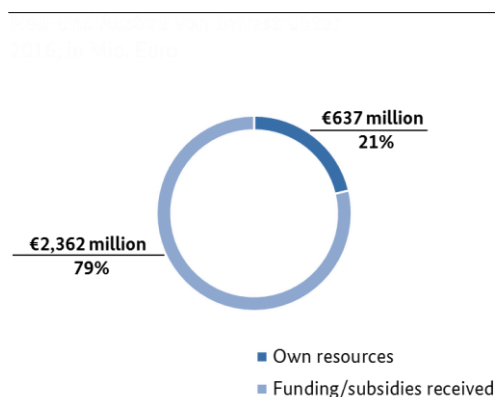


Figure 68: New construction, modernisation and expansion of infrastructure broken down by own funds and external funding (2016; in million euros; shares in percent)

At 79 percent, the external funding rate for the new construction, modernisation and expansion of the infrastructure was lower than the external funding rate of 98 percent for investment in existing infrastructure.

The federal government provided more than €4.6 billion to subsidise investment measures totalling €5.7 billion in 2016. These funds represented 81 percent of the total investment. Germany's federal states and local authorities provided a further 15 percent (a little more than €0.8 billion) while EU funding covered another four percent.

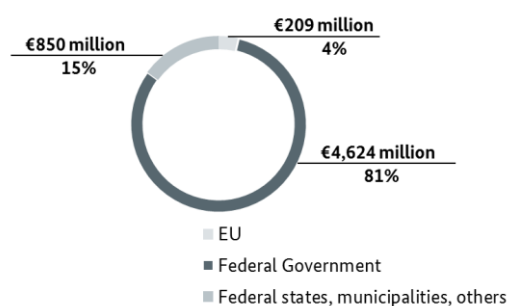


Figure 69: Funding sources of investment measures (2016; in million euros; shares in percent)

# IRG-Rail and the Rail Market Monitoring Scheme

Participation in international market monitoring activities and conducting an international market analysis have become firmly established in the railway segment. Member States have been required to provide data for the European Commission's Rail Market Monitoring Scheme since 2015.

## Contents

IRG-Rail Market Monitoring	76
Rail Market Monitoring Scheme of the European Commission	80



## International market monitoring

Competition in the European railway markets continued to develop positively in the year under review. The competitors of well-established railway undertakings managed to gain further market shares both in the passenger and the freight transport markets.

### IRG-Rail Market Monitoring

The Independent Regulators' Group Rail (IRG-Rail) was established by European regulatory authorities in 2011 with the aim of driving the harmonisation of the European railway market forward and using coordinated regulatory approaches.

The Market Monitoring Working Group has developed a cross-border market monitoring system which is adjusted every year to reflect different focus issues.

The annual Market Monitoring Report offers analyses of market trends, the development of competition in participating countries and changes in infrastructure.

This working group was chaired by the French regulatory authority ARAFER during 2016. The Bundesnetzagentur is primarily responsible for obtaining data from all participating countries and subsequently evaluating and processing it.



Figure 70: Route length (2015; in km)

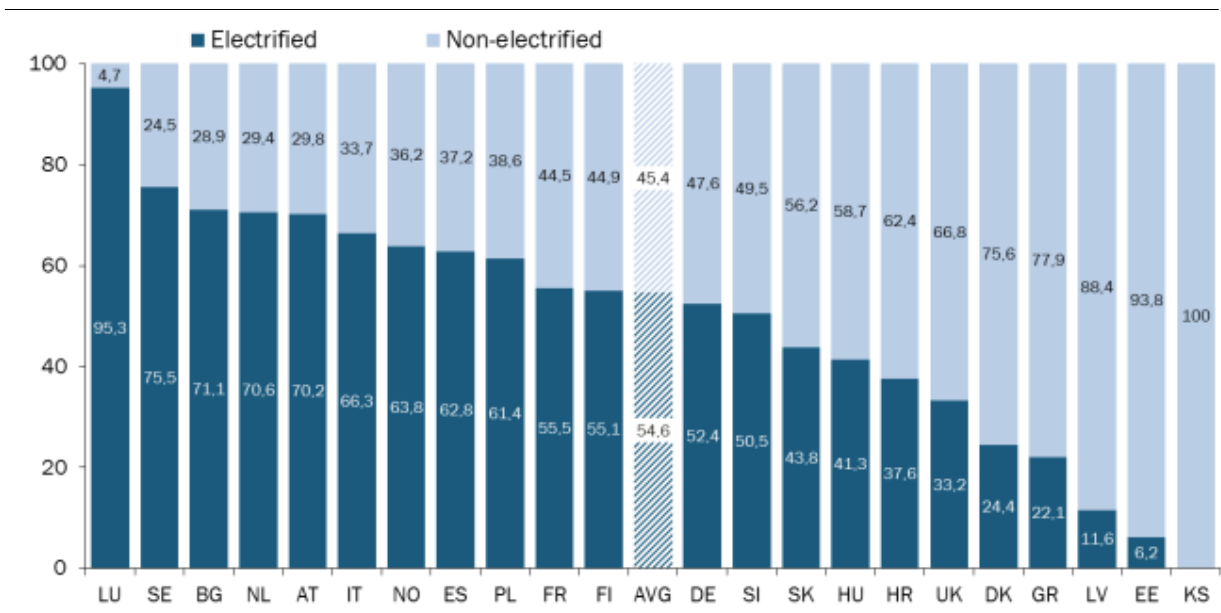


Figure 71: Share of electrified routes (2015; in km)

A total of 24 countries contributed to the report for the 2015 reporting year through their standardised provision of data. The participating countries account for routes totalling 205,538 kilometres.

Ninety-two percent of these routes belong to the successors of former state-owned railways; up to 55 percent of them are electrified.

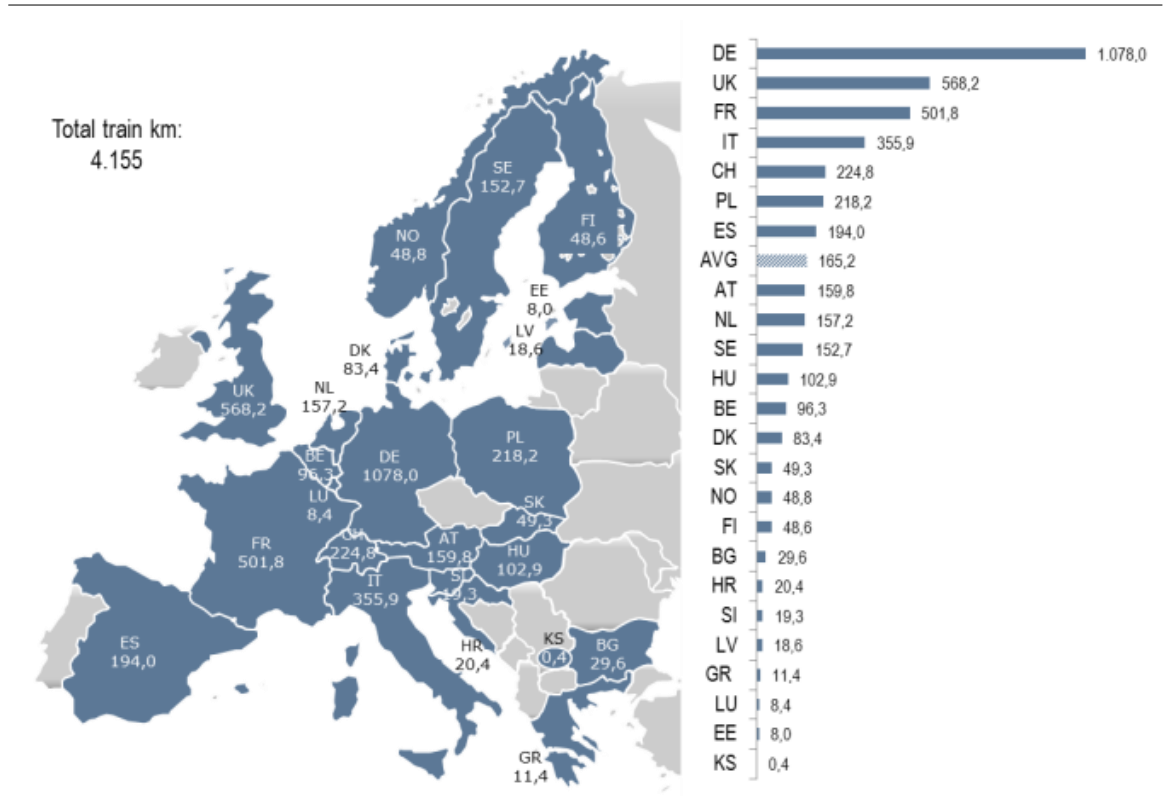


Figure 72: Rail freight and passenger transport (2015; million train-path kilometres)

A total of 4.2 billion train-path kilometres were travelled in the rail network; freight transport accounted for 18 percent of this amount and passenger transport for the remaining 82 percent.

The rail freight segment provided 392 billion tonne-kilometres in transport services, while the passenger rail transport segment provided 432 billion passenger kilometres. Both of these categories are growing an average of 1.5 percent a year.



More than 500 railway undertakings operate in the 24 participating countries. A total of 340 operate in Germany alone. Ninety-two percent of these undertakings are not affiliated - at either national or international level - with an incumbent<sup>11</sup>. The majority of non-incumbent undertakings (60%) operate in the rail freight transport segment. One-third is active in the passenger rail transport segment, while around ten percent operate in both segments. This shows that at European level, competition is particularly well developed in the rail freight transport segment.

The track access charge per train-path kilometre for the minimum access package averaged €4.30 for passenger rail transport services and €2.60 for rail freight transport in the countries examined. At €5.00 and €2.90, Germany was close to the European average. The spread between other countries ranged from €0.20 (Spain, freight transport) to €8.10 (France, passenger transport) all the way to €16.50 (Estonia, freight transport). Looking at the last five years, track access charges in the rail freight transport segment have declined; in the passenger rail transport segment they have increased steadily.

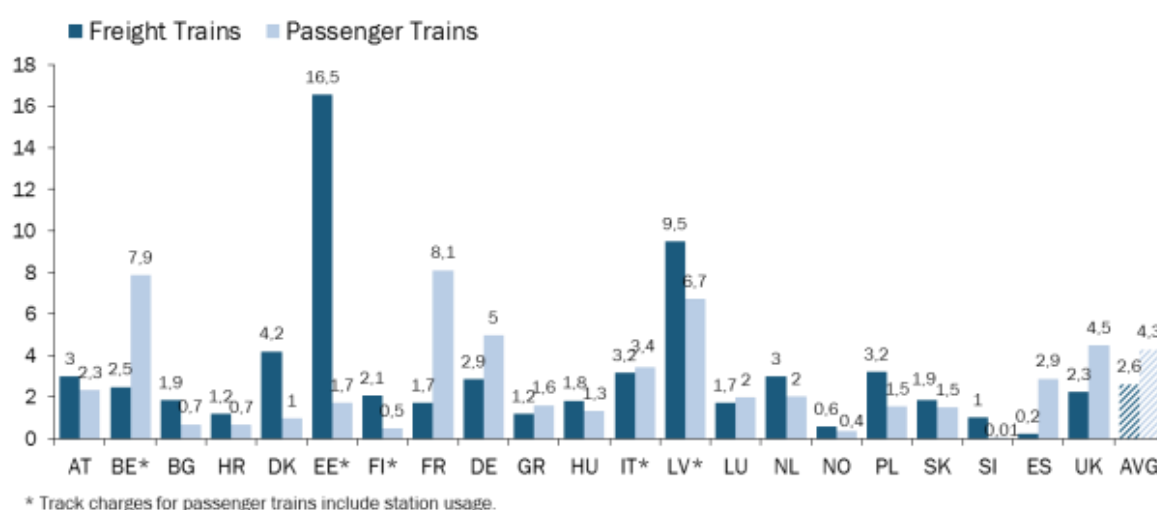


Figure 73: Average track access charge for the minimum access package (2015; euros per train-path kilometre)

IRG Rail publishes its annual report on the internet. The 2016 report can be downloaded free of charge from the following address:

<http://www.irg-rail.eu/public-documents/2015/>

The IRG-Rail Market Monitoring report for 2017 is due to be published in the first quarter of 2018.

<sup>11</sup> An incumbent is an established undertaking. In the railway field, "incumbent" is generally used to designate the successors of former state-owned railways.

## Rail Market Monitoring Scheme of the European Commission

Pursuant to Article 15 (4) of Directive 2012/34/EU, the European Commission is required to report every two years to the European Parliament and the Council on the railway market in Europe.

The report examines the condition of the railway network in the European Union as per the above-mentioned Directive, as well as the development of the internal market for rail services and service quality. It also maps out developments in framework conditions such as trends in infrastructure charges, capital allocation and infrastructure restrictions, infrastructure expenditure and financing, plus price development, the quality of passenger transport services, the employment trend and the social environment.

The European Commission issued Implementing Regulation (EU) 2015/1100 in July 2015. This Regulation requires Member States to provide the European Commission certain information regarding the development of the railway markets. This is done as part of the Rail Market Monitoring Scheme (RMMS).

Since 2016, the Member States have had the option of delivering data to the European Commission using a data portal.

The European Commission's fifth Report on monitoring development of the rail market was published in December 2016. This report is available in several languages free of charge at:

<http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2016:780:FIN>

The next report is due to be published in May 2018.

## ANNEX



## Annex

### Method used for rating influencing factors

The chapters “Ratings for access to railway infrastructure” and “Ratings for and development of pricing systems” outline the views of railway undertakings and regional transport authorities regarding key factors that influence the railway market.

The findings outlined in these chapters are based on the feedback that railway undertakings and regional transport authorities responsible for short-distance passenger rail transport service provided for the annual market survey. As part of this survey, market players are asked to rate issues relating to access and non-discrimination. The scale used for these ratings ranged from “1 - Excellent, no need for action” to “5 - Inadequate, urgent action necessary”. Even though this part of the questionnaire was optional for the respondents, many of the railway undertakings offered their assessment of the current market situation. As a result, the published results reflect the market situation and can thus be regarded as representative. The order of similar indicators in the ratings particularly reveals the areas where railway undertakings see the most problems.

Since the railway undertakings usually assess the market from their point of view at the time of the survey, these findings, unlike the other analyses presented here, refer to the year in which the Bundesnetzagentur conducted the survey (2017).

## DB Netz AG's track access charging system starting 2018

	2018
market segment short-distance	
Baden-Württemberg (Lastfahrt)	5.112
Baden-Württemberg (Leerfahrt)	2.990
Bayern (Lastfahrt)	4.983
Bayern (Leerfahrt)	3.151
Berlin (Lastfahrt)	5.413
Berlin (Leerfahrt)	3.290
Brandenburg (Lastfahrt)	5.531
Brandenburg (Leerfahrt)	3.456
Bremen (Lastfahrt)	5.439
Bremen (Leerfahrt)	3.520
Hamburg (Lastfahrt)	4.778
Hamburg (Leerfahrt)	2.884
Hessen (Lastfahrt)	4.864
Hessen (Leerfahrt)	2.954
Mecklenburg-Vorpommern (Lastfahrt)	5.406
Mecklenburg-Vorpommern (Leerfahrt)	3.265
Niedersachsen (Lastfahrt)	5.189
Niedersachsen (Leerfahrt)	3.375
Nordrhein-Westfalen (Lastfahrt)	4.970
Nordrhein-Westfalen (Leerfahrt)	3.340
Rheinland-Pfalz (Lastfahrt)	5.155
Rheinland-Pfalz (Leerfahrt)	3.141
Saarland (Lastfahrt)	5.279
Saarland (Leerfahrt)	3.194
Sachsen (Lastfahrt)	5.219
Sachsen (Leerfahrt)	3.199
Sachsen-Anhalt (Lastfahrt)	5.187
Sachsen-Anhalt (Leerfahrt)	3.115
Schleswig-Holstein (Lastfahrt)	5.285
Schleswig-Holstein (Leerfahrt)	3.255
Thüringen (Lastfahrt)	5.226
Thüringen (Leerfahrt)	3.180
market segment long-distance	
Metro Tag Min ( $v \leq 100$ km/h)	5.07
Metro Tag Max ( $v \geq 160$ km/h)	11.63
Basic	4.51
Nacht	2.51
Lok-/Leerfahrt	2.05
Charter/Nostalgie	2.05
Punkt-zu-Punkt	4.08
market segment freight	
Standard	2.83
Sehr schwer	4.05
Gefahrgutganzzug	3.46
Gefahrgutgüternahverkehr	1.88
Güternahverkehr	1.67
Lokfahrt	1.67
Sonstige Zuschläge	
Zuschlag nach LaTPS*	4.00%
leistungsabhängiger Bonus**	0.05

Source: DB Netz AG (information in Euro)

\* Only applies when less than 90 percent of the goods waggons making up the freight train fulfil the requirements of the Technical Specification for Interoperability (TSI) Noise.

\*\* Bonus per axle kilometre (maximum of €211 per axle) for the use of rolling stock that has been retrofitted to be quieter





## List of figures

Figure 1: Market definition used in the Railway Market Analysis .....	10
Figure 2: Development of GDP in real terms .....	12
Figure 3: Development of the modal split in the freight transport market .....	13
Figure 4: Development of the modal split in the passenger transport segment .....	13
Figure 5: Development of employment in the railway market.....	13
Figure 6: Availability of personnel for railway undertakings.....	14
Figure 7: Availability of personnel for infrastructure managers .....	14
Figure 8: Licensed public railway undertakings.....	16
Figure 9: Revenues in the railway market.....	17
Figure 10: Development of transport volumes broken down by type of transport service .....	18
Figure 11: Development of traffic broken down by type of transport service.....	18
Figure 12: Development of average transport and travel distances .....	19
Figure 13: Development of the competition, broken down by type of transport service .....	21
Figure 14: Ownership structures of railway undertakings .....	22
Figure 15: Development of revenues and average train occupancy in the short-distance passenger rail transport.....	23
Figure 16: Development of revenues and average train occupancy of not state owned railways in the short-distance passenger rail transport.....	23
Figure 17: Development of revenues and average train occupancy in the long-distance passenger rail transport.....	24
Figure 18: Development of revenue and average freight tonnage in the rail freight transport.....	25
Figure 19: Development of revenues and average freight tonnage of not state owned railways in the rail freight market.....	25
Figure 20: Development of retail prices.....	27
Figure 21: Ratings of the construction measures scheduled by infrastructure managers.....	28
Figure 22: Ratings of the infrastructure managers' scheduled construction measures .....	29
Figure 23: Development of powered rolling stock.....	34
Figure 24: Share of subsidies from regional transport authorities in revenue generated in the short- distance passenger rail transport segment.....	40
Figure 25: Development of market shares for contracted transport services in the short-distance passenger rail transport segment.....	41

Figure 26: Number of concluded transport contracts an anticipated number of concluded transport contracts.....	41
Figure 27: Award of transport contracts by regional transport authorities, by tender and without tendering...	41
Figure 28: Share of contract-award procedures in the short-distance passenger rail transport segment.....	42
Figure 29: Award of transport contracts by regional transport authorities to railway undertakings, without tendering.....	42
Figure 30: Award of transport contracts to railway undertakings by regional transport authorities by tender .....	42
Figure 31: Ratings for train-path condition and development assigned by regional transport authorities for short-distance passenger rail transport.....	44
Figure 32: Ratings for the development and condition of passenger stations and stopping points assigned by regional transport authorities for short-distance passenger rail transport.....	44
Figure 33: Regional transport authorities' ratings of the level of non-discrimination in the infrastructure managers' pricing systems .....	45
Figure 34: Regional transport authorities' rating of the infrastructure managers' pricing systems .....	45
Figure 35: Revenue generated from usage charges in the railway infrastructure market .....	48
Figure 36: German infrastructure managers' total revenue from track access charges, broken down by type of service .....	49
Figure 37: Development of train-path kilometres, broken down by type of service.....	49
Figure 38: Share of infrastructure managers that have published a network statement .....	50
Figure 39: Share of service facility operators that have drawn up a network statement for service facilities.....	50
Figure 40: Share of infrastructure managers that have published schedules of their charges .....	51
Figure 41: Share of service facility operators that have drawn up schedules of their charges.....	51
Figure 42: Factors that influence the railway market.....	52
Figure 43: Ratings given for track access.....	53
Figure 44: Trends in the ratings given for areas pertaining to train paths .....	53
Figure 45: Ratings for access to service facilities.....	55
Figure 46: Trends in the ratings given for areas pertaining to service facilities .....	55
Figure 47: Maintenance facilities for the maintenance and repair of rolling stock.....	56
Figure 48: Maintenance services provided by enterprises, by type of rail vehicle .....	56
Figure 49: Range of the average track access charges .....	60
Figure 50: Development of the infrastructure managers' average track access charges .....	61
Figure 51: Range of average station charges .....	62

Figure 52: Development of the average station charge.....	62
Figure 53: Ratings for the level of non-discrimination in IMs' pricing systems .....	63
Figure 54: Development of the ratings for the level of non-discrimination in the infrastructure managers' pricing systems.....	63
Figure 55: Infrastructure managers' price-performance ratio.....	64
Figure 56: Development of the infrastructure managers' price-performance ratios .....	64
Figure 57: Market overview of railway undertakings' operating results in short-distance passenger rail transport and rail freight transport.....	66
Figure 58: Range of railway undertakings' operating results .....	67
Figure 59: Operating result per passenger-kilometre/tonne-kilometre, by type of transport service .....	68
Figure 60: Operating result per train-path-kilometre/tonne-kilometre for non-federally owned railway undertakings in the rail freight transport segment.....	68
Figure 61: Railway undertakings' profit margins .....	69
Figure 62: Profit margins of non-federally owned railway undertakings in the rail freight transport segment .....	69
Figure 63: Share of infrastructure access charges as a percentage of railway undertakings' revenue, by mode of transport .....	70
Figure 64: Breakdown of the infrastructure access charges of the railway undertakings .....	71
Figure 65: Revenue and expenditure of non-federally owned infrastructure managers.....	72
Figure 66: Development of revenue and expenditure of non-federally owned service facility operators .....	73
Figure 67: Investment in infrastructure, broken down by own resources and subsidies .....	73
Figure 68: New construction, modernisation and expansion of infrastructure broken down by own funds and external funding .....	74
Figure 69: Funding sources of investment measures.....	74
Figure 70: Route length.....	76
Figure 71: Share of electrified routes .....	77
Figure 72: Rail freight and passenger transport.....	78
Figure 73: Average track access charge for the minimum access package .....	79

## List of abbreviations

AEG	General Railway Act
AG	Stock company
ARAFER	Autorité de régulation des activités ferroviaires et routières (French regulatory authority)
BAG	Federal Office for Goods Transport
GDP	Gross domestic product
DB AG	Deutsche Bahn AG
e. V.	Registered association
EBA	Federal German railway authority
EEG	Renewable Energy Sources Act
IM	Infrastructure managers
EnWG	Energy Industry Act
ERegG	Rail Regulation Act
EU	European Union
GmbH	Limited liability company
HKX	Hamburg-Köln-Express GmbH
IRG-Rail	Independent Regulator's Group-Rail (alliance of independent railway regulators in Europe)
km	Kilometre
LaTPS	Noise-based track access charging system
m	Million
bn	Billion
NVR	National Vehicle Register
Pkm	Passenger-kilometre

RMMS	Rail Market Monitoring Scheme (market monitoring at European level)
RU	Railway undertaking
StromNEV	Ordinance concerning Charges for Access to Electricity Networks (Electricity Network Charges Ordinance)
t	Tonne
TKG	Telecommunications Act
tkm	Tonne-kilometre
Trkm	Train-path kilometre
TSI	Technical Specification for Interoperability
TWh	Terawatt hour
VPI	Association of wagon keepers in Germany

## Legal Notice

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### Editorial deadline

December 2017

### Printed by

MKL Druck GmbH & Co. KG

### Photos

P. 77: 123rf.com, Pavlo Vakhrushev

All others: Bundesnetzagentur

### Text

Section 702 — Rail Regulation Economic Policy, Market Watch, Statistics