

Independent Regulators' Group – Rail

Working group Charges

Appendix to the paper on Market Segmentation and Mark-up Case Studies

November 2021

Introductory Remarks

This document is an appendix to the paper proposed by the Working group Charges on market segmentation and mark-ups. It presents case studies from Austria, Belgium, France, Germany, Great Britain, Norway, Poland, Sweden, and the Netherlands. These case studies present the country specific situation with the legal framework of the Recast 2012/34 to better illustrate the implementation of the EU directive 2012/34 in different countries.

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1. Austria

The Austrian IM – OEBB Infrastruktur AG – has introduced a new charging scheme in 2018, which also includes mark-ups for different market segments. Schienen-Control Kommission – the Austrian RB – published a decision for the years 2018 and 2019. This case study refers to the decision of Schienen-Control Kommission and also to the current network statement for further details.

1.1. Market segmentation

The IM proposed six market segments and by decision of the RB one market segment (freight manipulated) was split into two market sub-segments (Freight Single Wagon Load traffic and Freight combined traffic). Therefore, the charging system consists of seven market segments:

Minimum market segmentation as in Art 32 (1) 2012/34/EU	Market segments
Passenger services without PSO	Commercial
Passenger services with PSO	Public service
	long-distance passenger traffic
	Short-distance traffic high
	Short-distance traffic low
Freight services	Freight single wagon load traffic
	Freight combined traffic
	Freight non-manipulated

TABLE 1: MARKET SEGMENTS IN AUSTRIA 2018 AND ONGOING

Service trains (empty passenger trains and train sets composed of multiple traction units) are not part of the market segmentation and only carry direct costs.

The following graphic shows how a passenger train is allocated to a market segment. This graph is copied from the network statement of the OEBB-Infrastruktur AG from 2021 and has been a part of the Network statements since 2018.

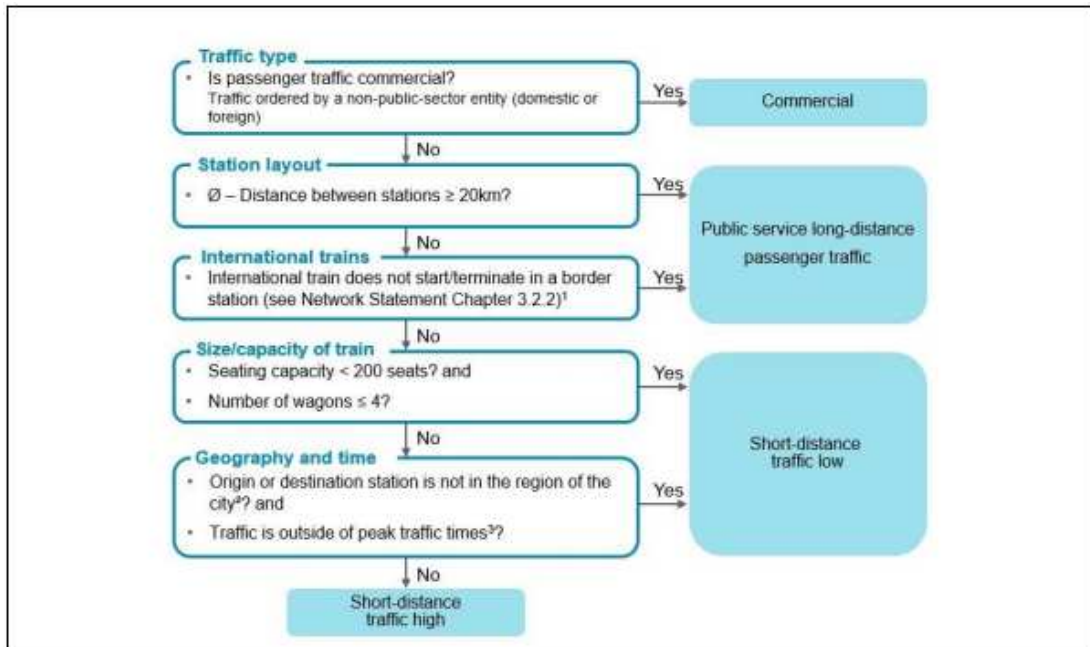


FIGURE 1: SEPARATION OF PASSENGER SERVICES SOURCE: NETWORK STATEMENT OF OEBB-INFRASTRUKTUR AG 2021, PAGE 53

For passenger services the first distinction is made, if the services receive a PSO contract. All services without PSO contract are allocated to the market segment “Commercial”. Within PSO services, services are separated between “long-distance” and “short-distance”. The separation depends on the average distance between stops or if the train is an international train. This separates “urban or regional” versus “interurban passenger services” as in Annex VI No 1 (e) of the Directive 2012/34/EU. PSO services with short distances are separated further in two segments based on the traffic times, the used rolling stock (number of seats and wagons) and if the service starts or ends in a city region.

For freight services, they IM suggested to have only two market segments: freight manipulated and freight non-manipulated.

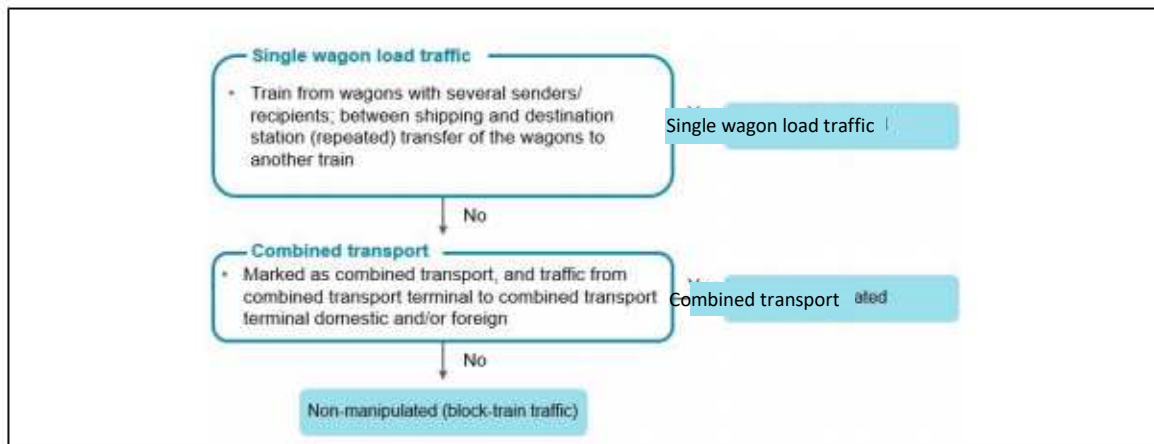


FIGURE 2: SEPARATION OF FREIGHT SERVICES, SOURCE: NETWORK STATEMENT OF OEGB-INFRASTRUKTUR AG 2021, PAGE 54 AND OWN MODIFICATION.

The regulatory body deemed it necessary to further separate the market for freight services. As it can be noticed from the Figure 2 the market segment “freight manipulated” consists of two groups of freight services: “single wagon load traffic” and “combined transport”. Looking into the network statement of the OEGB Infrastruktur AG shows that both groups of traffic are different:¹

“In the single wagonload traffic system, freight wagons from different shipping companies are collected in one station (e.g. marshalling yard, shunting location), sorted by means of the train composition process and brought together as one train. This train transports the collected freight wagons to 2021 Network Statement Page 55 the next station, where they are either again sorted and separated into different trains or distributed to the different recipients. Single wagonload traffic involves the (frequent) transfer of freight wagons from train to train, which generally requires a significant amount of shunting and time for train composition. The stations themselves (e.g. marshalling yard, shunting location) in which the transfers take place, collect, sort and redistribute the single wagonload traffic. When applicants order single wagonload rail traffic services (infrastructure capacity requests), these must be identified as single wagonload train classes (DG, SDG, NG, SNG, VG, SVG9, BED or SBED). The existence of a single wagonload traffic system must be presented using suitable evidence (e.g. production, train composition or wagon transfer plans)”

“For combined transport (unaccompanied or accompanied CT), the transport unit (containers, swap bodies, semi-trailers, MOBILER vehicles, road vehicles, etc.) is transshipped instead of the freight itself. Rail traffic services that exclusively ship these transport units are classified in the “Freight traffic manipulated” market segment. The CT identifier (profile) is decisive for classification together with the train run/production concept ordered (traffic between domestic or international CT terminals¹¹). When applicants order combined transport services (infrastructure capacity requests), these must be identified as train classes TEC, STEC, KGAG, SKGAG, ROLA or SROLA. If freight traffic cannot be classified as single wagonload traffic or combined transport, it is classified in the “Freight traffic non-manipulated” market segment.”²

¹ Network statement OEGB-Infrastruktur AG: [network-statement-2021.pdf \(oebb.at\)](https://www.oebb.at/network-statement-2021.pdf)

²

All freight services, that are neither “single wagon load traffic” nor “combined traffic” are included in the market segment “freight non-manipulated”. For the segmentation in freight services, the two following pairs of services of the Annex VI of the Directive 2012/34/EU have been used:

“(d) combined transport versus direct trains;”

“(f) block trains versus single wagon load trains;”

1.2. Calculation of Mark-Ups

The calculation of mark-ups uses a Ramsey-Boiteux Model:

$$p_i = \frac{c_i}{1 - k * rTF}$$

p_i price per market segment

c_i direct cost per market segment in train-km

k constant, that regulates the planned income

rTF relative ability to bear per market segment, which includes the elasticity of the final customers, the cost structure of the RU and the pass-through rate

Direct costs are calculated by OEBS-Infrastruktur AG in accordance with the directive 2015/909. These direct costs are calculated by train-km and gross-ton km and then modulated using different types of trains (passenger long-distance, passenger urban services and freight services). The different train services are allocated to market segments and then the direct costs per market segments (c_i) are derived.

OEBS-Infrastruktur AG needs to finance a specific portion of the cost by mark-ups. This amount is determined by the government and therefore a given variable to the calculation of mark-ups. The constant (k) ensures that the revenues from mark-ups are equal to the amount that needs to be covered by mark-ups.

The relative ability to bear is calculated as the inverse function of the elasticity of the final customer (ε), the cost structure of the RU (CS) and the pass-through rate (PTR):

$$rTF_i = \frac{1}{\varepsilon * CS * PTR}$$

The OEBS-Infrastruktur AG has presented a study, which determined the elasticities (ε) from the final customers by interviews. In order to transform the final customer elasticity to the elasticities of the RUs, two further parameters have to be considered:

- The cost structure represents the proportion of the charges to the full costs of the service. Everything else being stable, an increase in charges would not lead to a proportional increase to the costs of the final customer. Considering this cost structure would be necessary for using the final customer elasticity in the Ramsey-Boiteux Model.

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- Pass-through rate shows which part of the increase in charges is handed over to the final customer. For caution principle the assumption was made that 100 % of an increase or decrease in charges is handed to the final customer.

2. Belgium

2.1. Market segments

In Belgium, we identify the following market segments:

- passenger services subject to a public service obligation (HkvPso);
- commercial passenger transport services (HkvNPso);
- goods transport services (Hkm);
- services for commercially operated high-speed passenger transport (Hst);
- other trains (HkvOther/HkmOther): notified bodies, technical trains, staff trains, de-icing trains;
- tourism organizations (HkvTo/HkmTo).

These have been determined in accordance with the legislation in force. According to the article 56 of the Rail Code, Infrabel has to define at least the following three segments:

- freight services;
- passenger services under a public service contract;
- other passenger services.

Among the “other passenger services” a distinction has been made between “services for commercially operated high-speed passenger transport (Hst)” and “commercial passenger transport services (HkvNPso)”. In addition to these segments, Infrabel has decided to create the “other trains” segment for non-commercial passenger or freight train services (HkvOther/HkmOther). Finally, the IM has created a specific segment for tourism organisations³ given their special status. The diagram below shows market shares by market segment:

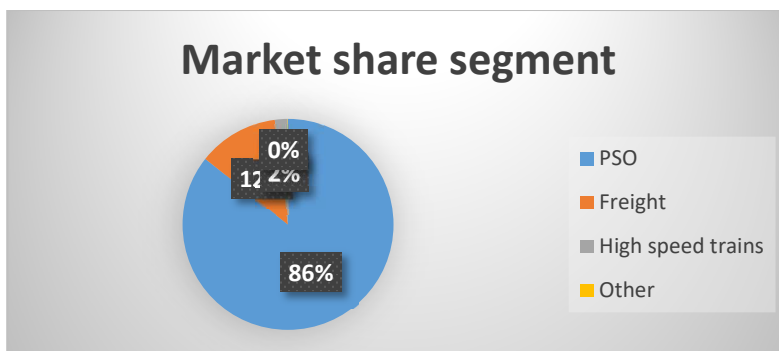


FIGURE 3: MARKET SHARES BELGIUM

³ In accordance with the principles of the Royal Decree of 8 May 2014 *laying down requirements for the circulation of vehicles intended exclusively for heritage, historical or tourist purposes on the national rail network*, tourism organisations pay a fixed charge. This charge is not indexed annually.

The subcategories of the “Other” segment shown in the diagram are as follows ⁴:

- Non PSO Classical lines: 0,01508%
- Technical and staff trains: 0,06113%
- Touristic trains: 0,00000%.

2.2.Process

The market segments have been defined by the government through the Royal Decree of the 19th July 2019 and made in coordination with the infrastructure manager based on analyses (literature reviews, specificities of the railway infrastructure in Belgium). So far, the Regulatory body has not been involved in this process at any time. However, the Regulatory body is entitled to launch, within the limit of the Royal Decree and the railway act, an ex-officio investigation. The power of the Regulatory body in this type of investigation is limited to control the principles set by the Royal Decree. It is specified in the Royal Decree that specific cost differentials can be made depending on the time and the density of the lines.

The “time” differentiations are as follows:

- Off-peak hours (week): 19h-5h59
- Normal hours (week): 9h- 14h59
- Peak hours (week): 6h-8h59 and 15h-18h59
- NSL-peak (week): 6 h-8h59 and 15h-18h59 (for junction Brussels North Brussels Midi (from the 2022 timetable).
- Weekend (day): 6h-18h59
- Weekend (night): 19h-5h59

The density classes are as follows:

- Very low density: 0-10.000 tr-km per year on that specific line
- Low density: 10.000-20.000 tr-km per year on that specific line
- Medium density: 20.000-30.000 tr-km per year on that specific line.
- High density: 30.000-40.000 tr-km per year on that specific line.
- North South Line /Very high density: above 40.000 tr-km per year on that specific line.

The mark-up have been designed in function of the following grid:

⁴ % calculated on the basis of real TRKM between 13/12/2020 and 31/07/2021

Classical lines

Period	Off-peak hours	Normal hours	Weekend night	Weekend day	Peak	Hyper-peak
	Monday to Friday [19h, 6h[	Monday to Friday [9h, 15h[	Saturday, Sunday and holidays [19h, 6h[	Saturday, Sunday and holidays [6u, 19u[	Monday to Friday [6u, 9u[en [15u, 19u[	The part in hyper-peak of a train crossing the NSL between [6h,9h[or [15h,19h[.
Very low Lines with very little traffic	0,125229	0,308406	0,255172	0,505554	1,308766	NA
Low Lines with little traffic	0,241864	0,595649	0,492834	0,976419	2,527728	NA
Moderate Lines with average traffic	0,303996	0,748661	0,619433	1,227244	3,177057	NA
High Lines with high traffic	0,463938	1,142560	0,945342	1,872943	4,848629	NA
Very high Lines with very high traffic (except North-South Link)	0,826353	2,035089	1,683812	3,336025	8,636221	NA
NSL North-South Link	0,826353	2,035089	1,683812	3,336025	NA	13,206489

TABLE 2: COEFFICIENTS THAT APPLY TO THE HKV SEGMENTS FOR THE 2022 TIMETABLE (VALUE ON 1 JANUARY 2021)

Mark-up High speed lines

Period	Off-peak hours	Normal hours	Weekend night	Weekend day	Peak	Hyper-peak
Density class	Monday to Friday [19h, 6h[	Monday to Friday [9h, 15h[	Saturday, Sunday and holidays [19h, 6h[	Saturday, Sunday and holidays [6u, 19u[	Monday to Friday [6u, 9u[en [15u, 19u[	The part in hyper-peak of a train crossing the NSL between [6h,9h[or [15h,19h[.
On the whole network	1,917058	4,622046	3,890166	7,707328	19,942888	30,496618

The coefficients are shown in €/TRKM.

When indexing, the value is rounded to 6 decimal places.

TABLE 3: COEFFICIENTS THAT APPLY TO THE HST SEGMENTS FOR THE 2022 TIMETABLE (VALUE ON 1 JANUARY 2021)

The formula for calculating the Ramsey-Boiteux markup is as follows:

$$MU_{RB} = \sum_i (l_i * mu_{rbjltmi})$$

Where:

- $mu_{rbjltmi}$: the coefficient of the Ramsey-Boiteux markup that depends on the segment "j", the density class "l" to which section "i" belongs and the period "m" in which the section "i" is traversed (this coefficient is expressed in €/train-km);
- l_i : the length of the section 'i' traversed by the train, expressed in km.

The coefficients for the Ramsey-Boiteux markup are set out in appendix F.2.

3. France

The mark-ups applied, which are intended to contribute, if the market can bear this, to contribute to recover full costs, only concern passenger transport activities. Due to the particular economic context of the freight activity, mark-up for full cost recovery cannot be applied. The segmentation criteria used by the IM are different for PSO services and for non-PSO services.

3.1. Segmentation process and mark-ups for PSO activities

The segmentation of PSO passenger transport activities as presently foreseen in the network statement includes one segment per transport organising authority (AOT), i.e. one segment for each of the eleven French regions, Ile-de-France Mobilités and the State for the territorial equilibrium trains (TET).

There are two types of mark-up for the PSO activities which are: the “redevance de marché” and the “redevance d'accès”.

The “redevance de marché” is charged per path-km. A series of modifications has intervened in the Network Statement 2022. Firstly, the fee for PSO activities now depends on the UIC category group: 2-6 or 7-9. Secondly, SNCF Réseau has also introduced in the Network Statement 2022 a price modulation related to the theoretical train departure time for activities contracted by regions. This adjustment distinguishes peak and off-peak hours from Monday to Friday. Traffics on Saturdays and Sundays are regarded as normal hours. Beside this, a reduction of charges has been introduced that applies beyond a train path-km threshold that is different for each AOT.

In addition to the “redevance de marché”, SNCF Réseau levies for PSO activities the “redevance d'accès” that is also supposed to cover part of the fixed costs. Apart from Ile-de-France Mobilités the access charge for the activities contracted by the AOTs, is paid in full by the State.

3.2. Segmentation process and mark-ups for non-PSO activities

For non-PSO passengers, mark-ups are charged through the “Redevance de marché” per path-km.

For passenger transport activities on high-speed lines, tariffs are established according to five segments for domestic transport and eight segments for international transport. The five domestic segments on high-speed lines that are presented in the Network Statement are the following:

Segments	Market size (population)	Intermodal competition (air or road)	Current corridors
A	Important	Low	Paris Lyon St Etienne Radial
B	Medium	Low	BPL Radial
C	Medium	Average	East Radial * North Radial Alps Radial (Grenoble-Chambéry-Annecy-Alpine Valleys)
D	Important	High	Mediterranean Radial (Valence-Marseille-Montpellier-Perpignan-Nice) South-West Radial (Tours-Bordeaux-Toulouse-Bayonne-Tarbes, excluding SEA)
E	Inter-sectors or low	Average or low	BFC Radial Arras Radial Domestic inter-sectors

(* on a temporary basis for 2021-2023, the services on the East Radial will be subject to the D segmentation rate, enabling development consistent with historical pricing)

FIGURE 4: MARKET SEGMENTS FRANCE BELGIUM

SOURCE: SNCF RÉSEAU, NETWORK STATEMENT 2022 TIMETABLE, APPENDIX 5.5.1, CHARGING PRINCIPLES OF MINIMUM SERVICES, P. 16.

As indicated in the table, SNCF Réseau has designed those segments are designed on the basis of two following criteria applied to 45 urban areas:

1. market size measured by population level: it enables a characterization of the market's potential in terms of passengers;
2. intensity of intermodal competition (air and road transport) estimated using a comparison between the travel times of the different transport modes available, as shown in the figure below:

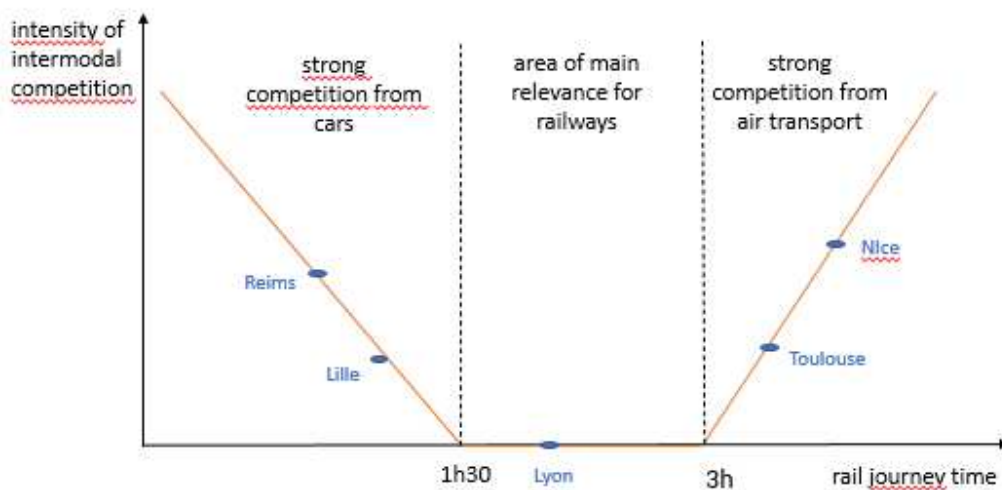


FIGURE 5: CHARGING PRINCIPLES OF MINIMUM SERVICES FRANCE

SOURCE: SNCF RÉSEAU, NETWORK STATEMENT 2022 TIMETABLE, APPENDIX 5.5.1, CHARGING PRINCIPLES OF MINIMUM SERVICES, P. 17.

For high-speed international trains, the segmentation presented in the Network Statement is based on international geographical corridors which include "radial" segments corresponding to traffic starting or ending at a Paris station and two "Intersector" segments corresponding to other domestic traffics.

SNCF Réseau conducts the "market can bear test" with the help of an economic model designed to represent a "normative transport operator". This model aims to construct the profit and loss account of a normative operator offering high-speed passenger transport services on all segments (domestic and international) of the national rail network.

Since the Network statement 2021, SNCF Réseau raises or lowers the charges for the high-speed line mark ups with respect to the theoretical time of departure of the train. This modulation consists of increasing charges for "peak hour" traffic and decreasing it for "off-peak hour" traffic. It is based on prior work to determine the times that can be described as "peak hours", "neutral hours" or "off-peak hours" with the help of data collected from passengers' "GSM tracks", marketed by a mobile telephone operator.

SNCF Réseau also applies a discount in the high-speed line market charge for single units (SU) and an increase for multiple units (MU). This modulation is theoretically based on the composition of the rolling stock. However, in practice, the Network statement 2021 provides that a train is considered to be a SU for a declared tonnage of 550 tonnes or less and a MU for a declared tonnage of more than 550 tonnes.

For passengers transport services on non-high-speed lines, daytime trains are subject to the same mark-up no matter whether they are designed for high-speed services or not, while other trains (night trains, auto-trains, and tourist trains) do not have to pay a mark-up.

4. Germany

4.1. Market Segmentation

The segmentation of the German main IM, DB Netz AG, is differentiated for long distance (Non-PSO), regional traffic (PSO) and freight. There are six freight segments of which the standard train is by far the largest segment.

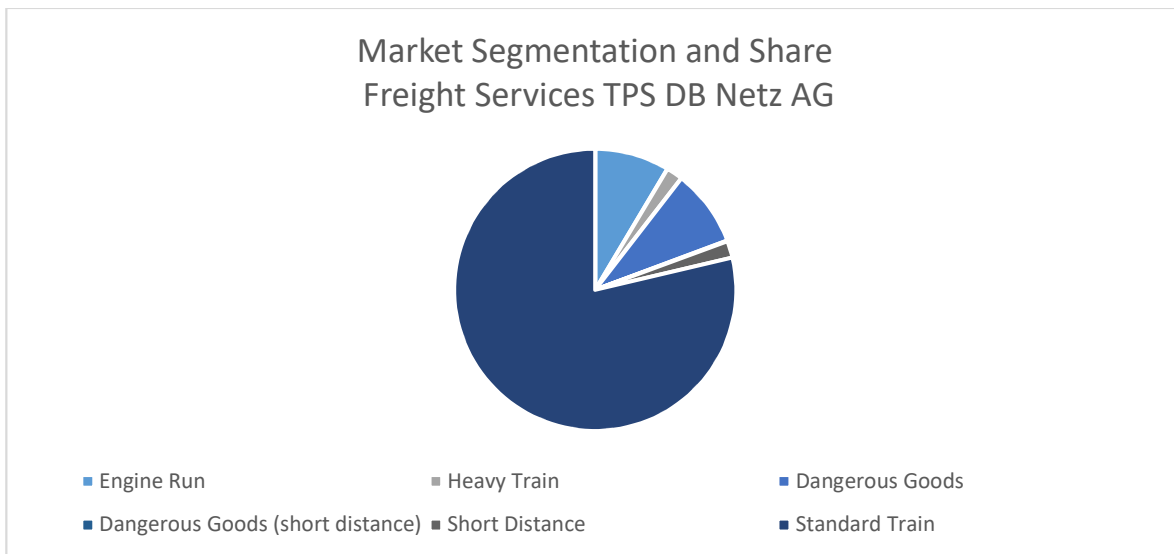


FIGURE 6: MARKET SEGMENTATION DB NETZ AG FOR FREIGHT SERVICES; SOURCE: DB NETZ AG

For long distance, there are seven segments.⁵ The three larger segments, Metro Min, Metro Max and Basic, are mostly offered by the RU incumbent, DB Fernverkehr. Within the smaller segments, other RUs offer transport services, for instance ÖBB Rail for night traffic.

⁵ One could say that there are 60 additional segments as the price increases for each kilometre per hour from Metro Min (100 km/h) to Metro Max (160 km/h), but that would not be very insightful for the graph. The traffic is proportionally allocated to Metro Min and Max, e.g. 50% of the train km of a train running at 130 km/h is going to either segment.

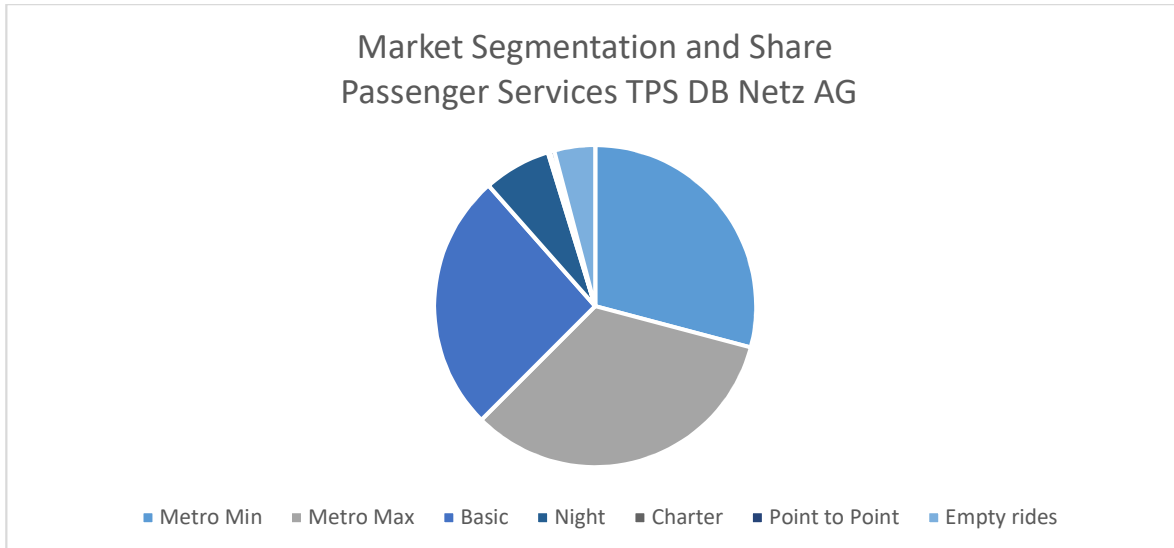


FIGURE 7: MARKET SEGMENTATION DB NETZ AG FOR PASSENGER SERVICES; SOURCE: DB NETZ AG

For regional traffic (PSO), there are 16 * 2 segments. One for reach federal state (Bundesland) and two categories: 1) Passenger Traffic and 2) Empty rides. A graph for this segmentation is not insightful, as it would just show the relative size of the regions.

The main IM usually hands in the application for the track pricing system early in October of the year before the next time table period starts. This date can be derived by backward induction. Paragraph 2 of Annex VIII of the railway law says that the time table changes on the second Saturday of December at midnight. Paragraph 3 states that the second Monday of April is the deadline for application for this period. Furthermore § 46 says that application has to be handed in 6 months before that. Hence, the second Monday of October is the final date for the application.

Before handing in the application, the IM conducts a market consultation, usually in September, reports all the received feedback by the market participants to the RB. On request, market participants have the right to participate in the proceeding and to attend the public hearings. They also have to right to issue official letters of inquiry that have to be reviewed by the RB

After careful deliberations, the RB publishes a decision with possible changes to the network statement. In the past, there have been some changes to the proposed segmentation. For instances changes to the night segment and the introduction of the short distance segments in freight. There was also a big discussion on the elasticity for the standard train but the complaint was recently withdrawn by the main IM.

The review of the system is supposed to last not more than 2 months but the RB has the right to extend this period if need be. A first review of the segmentation is currently in progress and has to be finalized by 2023. In the following, the segmentation is briefly described using two illustrations. For more detailed information we refer to the network statement of DB Netz AG.⁶

⁶ https://fahrweg.dbnetze.com/fahrweg-de/kunden/nutzungsbedingungen/nutzungsbedingungen/schiennetz_benutzungsbedingungen/snb_2021-4609716?contentId=1369106

The main differentiation for the larger segments depends on their speed and the type of stations. Trains within the metro segment connect metropolitan stations and highly frequented border points. These stations have more than 50,000 passengers per day and the border points have more than 5,250 trains per year.⁷ Furthermore, the average speed defines if the train is a metro min train (≤ 100 km/h) or a metro max train (≥ 160 km/h). In between each integer km/h is a segment of its own. The price elasticity is the lowest for metro max and a bit higher for metro min resulting in the different mark-ups. All other trains are allocated to the basic segment, if they do not belong in any of the following segments. The elasticity for basic is a bit higher than for the metro segments, as the average speed is lower and intermodal competition is expected to be higher.

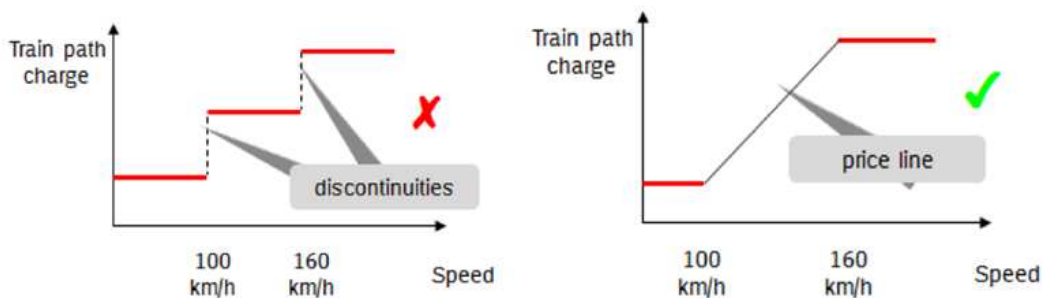


FIGURE 8: ILLUSTRATION OF PRICE CALCULATION FOR METRO SEGMENTS; SOURCE: DB NETZ AG

There is also a segment for night traffic which includes trains between 23:00 and 6.00. To include trains that would usually be regarded as night traffic (e.g. overnight services without stops between the origin and destination), the period is extended to include the first stop before or after the period with no commercial stop within Germany.

The point to point segment is meant to allow non-network RUs to offer some connections at a reduced quality of services when requesting track paths. Tracks cannot be planned connections and have to accept a construction buffer of up to 60 minutes. The RU can only offer up to 0 connections and not more than 4 journey a day are allowed. The average speed has to be below 130 km/h or the section is allocated to the metro segment. All but the last criteria have to be fulfilled on the entire track path.

Last but not least there is segment considering chartered trains and historical and museum rides, e.g. steam rides. The price elasticities for all three smaller segments are relatively higher than for metro and basic trains.

⁷ Based on an approximation: (16 trains / day * 365 days *) 90 %. Border points with same direction are combined



FIGURE 9: ILLUSTRATION OF SEGMENTATION FOR PASSENGER SERVICES DB NETZ AG; SOURCE: BNETZA

Within freight services all services are allocated to the standard train segment unless the services meets certain requirements. In this regard the standard train is not explicitly defined but a collecting segment for services not belong to any other segment within freight. This means that the segment is not exactly homogenous as it contains combined transports, single wage transports and block trains. The IM claims that he is not able to differentiate the different kinds of transport ex-ante. This issue is currently up to debate.

The IM decided to use weight as an additional criterion as it can be verified and only matters for certain services on selected relations. After consultations with the market 3,000 tons was chosen as the threshold for very heavy trains. This usually concerns “montan” trains for the heavy industry carrying ore or coal. The elasticity for this segment is a bit lower than for the other freight segments and the direct costs are higher.

The IM uses dangerous goods to differentiate dangerous goods block trains from other freight trains. The network statement obliges RUs to disclose if they are transporting these goods and some regulation serves as a reference point. These kind of trains are rather particular and demand more planning for the execution of the transport. In addition, intermodal substitution is limited as some of those goods have to be transported by rail. Hence, the price elasticity is the lowest within freight and hence the mark-ups are relatively higher.

When the system was introduced there were discussions with the market that demanded further segments for feeder trains, usually shorter single wagon transports that are combined later on to larger block train. The IM claimed that he needed observable criteria as the simple manipulation of the trains would not be sufficient. Hence, after some discussions the IM decided to use train rake (<370 m) and path length (< 75 km) to identify those short distance feeder trains. The price elasticity of those trains is relatively higher than for their block train counterpart.

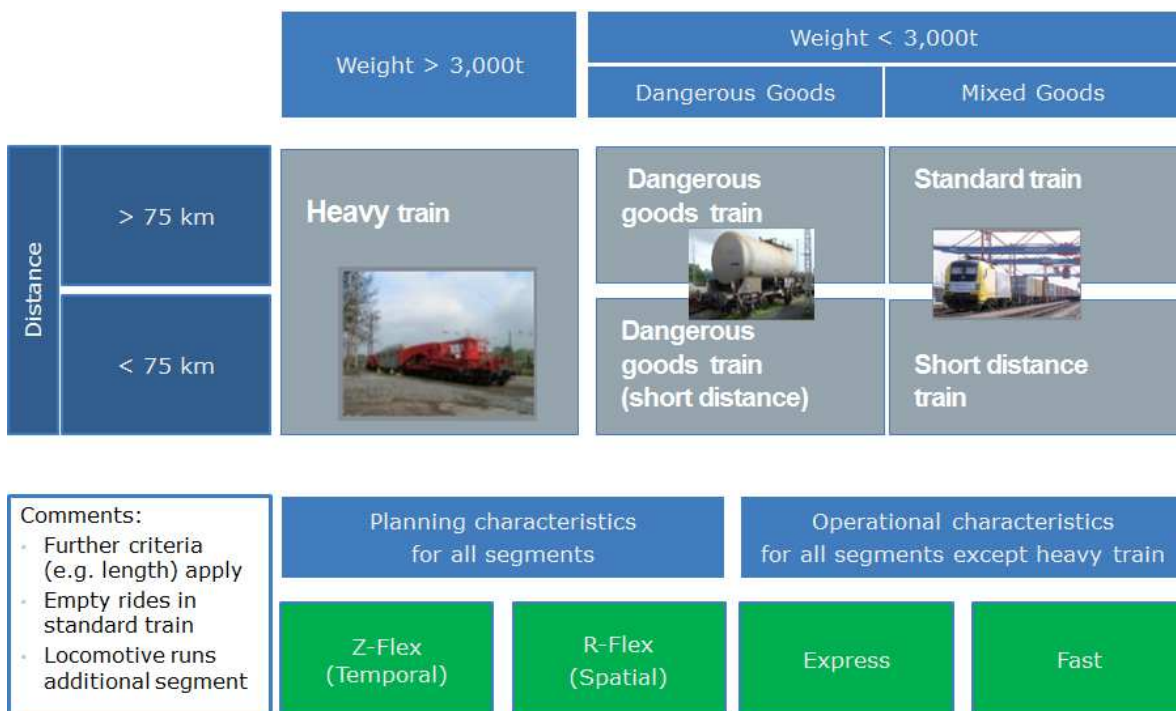


FIGURE 10: ILLUSTRATION OF SEGMENTATION FOR FREIGHT SERVICES DB NETZ AG; SOURCE: BNETZA

The German main IM describes its approach in Annex 6.1 of its network statement more or less as follows:

- definition of market segments should be practical, comprehensive and objective;
- market segments should, as far as possible, have common characteristics (materially, spatially, or temporally) of some kind that place them, as a class, in a different commercial position against another identifiable class; and
- choice of market segments should not distort incentives.⁸

⁸ By that we mean that RUs would change their behaviour to stay within a certain segment, because it is cheaper, although they would original fit into another segment

This has resulted in a clear segmentation where each train path or parts of it can be easily allocated to a segment. Generally, the segmentation is applied in between stops. Some issues have been also raised by the RB in its decision.

For instance, there has been an ongoing discussion about the standard train, which is the largest segment within freight. The standard train includes combined, wagonload and block trains. This in itself is not a homogenous segment, but for practical reasons the main IM cannot easily differentiate the different types. This issue is also currently investigated for the 5 year review.

There are some minor issues that come up every year. Some market participants would like a more open definition for point to point. Others complaint about the categorization of the frontier stations or the definitions of empty rides. For further information please check the decisions on the TPS published on the RB's homepage.

4.2. Mark-Up

The German main IM uses the Ramsey-Boiteux methodology, so that relative mark ups are inversely related to the price elasticity of the segment. There are other important factors that play a role in the calculation of the mark ups, as shown in the lower part of the following figure

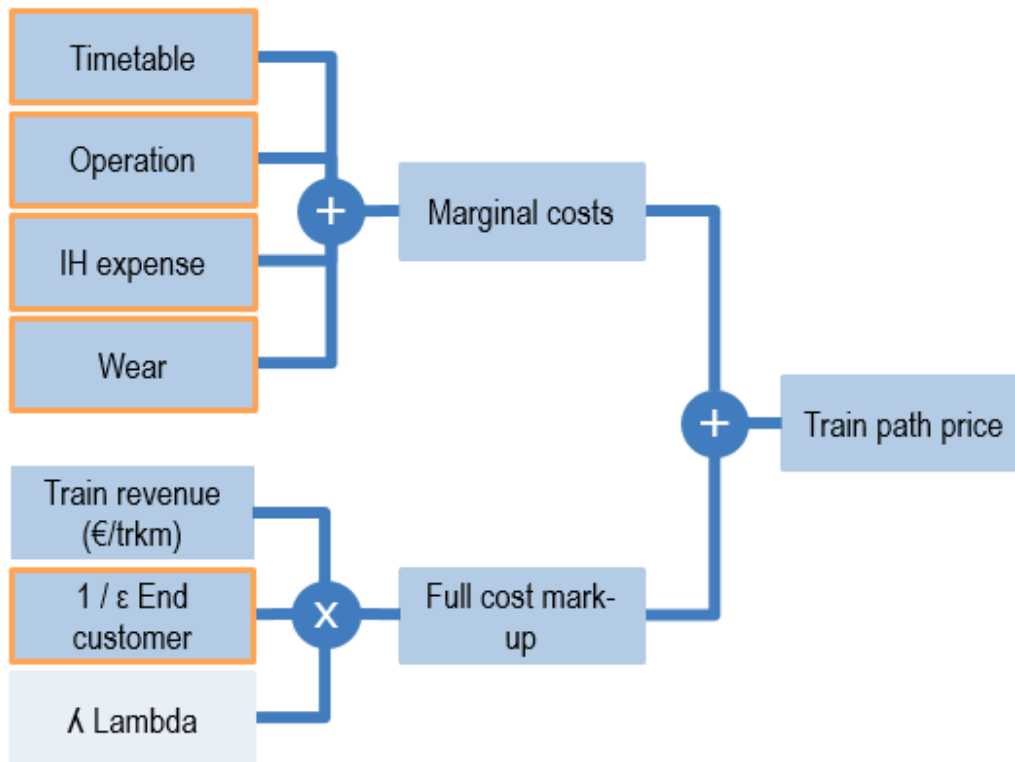


FIGURE 11: ILLUSTRATION OF TRACK PRICE CALCULATION PER SEGMENT FOR DB NETZ AG; SOURCE: BNETZA

Most prominently, there is the need to calculate a train revenue per trkm for each segment, which is used to transform the end customer price elasticity to the track price elasticity. Lambda is the factor used to calculate the mark-up derived by the model and depending on all segments and the earnings target.

The mark-ups for regional trains under PSO contracts are calculated using a different methodology based on the past price level and the increase of available funds for PSO services. This is laid down in § 37 ERegG.

So far, the main IM has always calculated mark-ups for all segments, while certain RUs claim that their segment would not be able to bear mark ups. As of now, no segment has been excluded of mark-ups as the RB always concluded that the absolute ability to bear mark-ups had not been violated.

The main IM relies on studies conducted as part of the general cost benefit analysis for the ministry of transportation⁹. However, the main IM issued follow up studies using the collected data and another further study on freight, which he presented in the official proceedings and which are not publically available. All these studies rely on stated preference methods and either interviewed citizens as potential passengers or freight companies. The studies derive function to calculate the price elasticity depending on certain exogenous factors besides the price, in particular market share and purpose shares within the segment. The end customer elasticities are transformed to track price elasticities assuming that due to market forces RUs will pass on track price changes proportionally to the share of track prices on total costs. This assumes perfect competition in all segments.

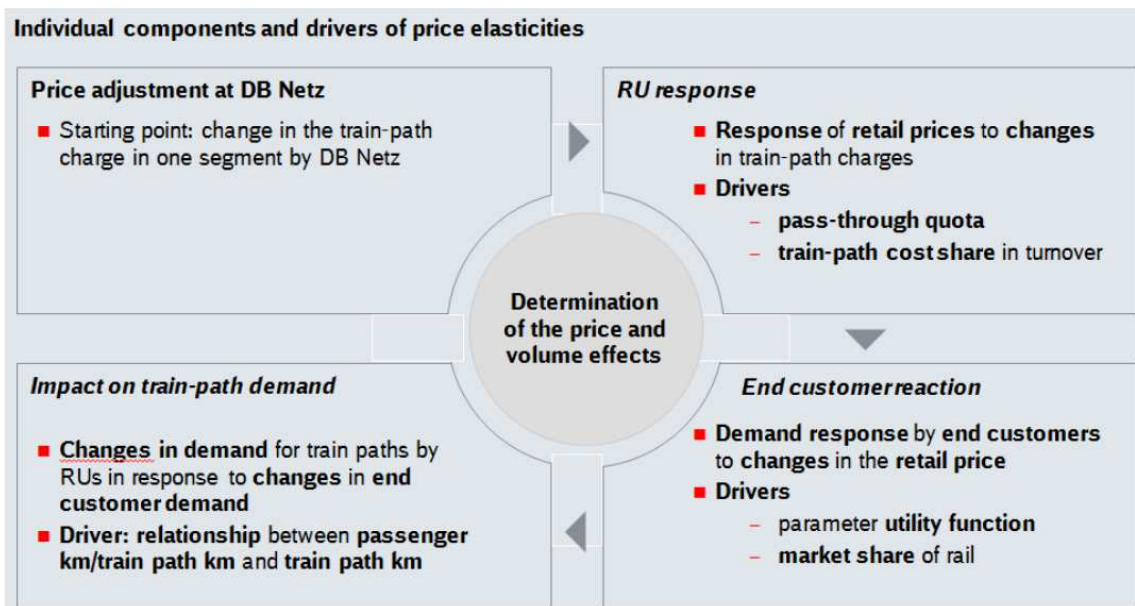


FIGURE 12: ILLUSTRATION OF TRANSFORMATION OF FINAL CUSTOMER ELASTICITY TO TRACK PRICE ELASTICITY; SOURCE: DB NETZ AG

The main IM provides a detailed Excel file which includes relevant information about direct costs, price elasticities, yields, etc. The methodology relies on the original Ramsey equation, but is somewhat simplified. The starting point is the original Ramsey equation, where p_i is the segment specific price, DC_i the segment specific direct costs and ϵ_i is the segment specific track price elasticity.

$$\frac{p_i - DC_i}{p_i} = \lambda / \epsilon_i$$

λ is the Lagrange multiplier that is numerically computed within the optimization problem. First, the track price elasticity is substituted as explained in Figure 12 using

⁹ <https://bvwp2030.de>

$$\epsilon_i = \epsilon_{EK_i} * \frac{p_i}{U_i}$$

U_i represents the segment specific revenues per trkm, so that the track price elasticity is proportional to the average costs of the track charges on revenues. After rearranging to calculate p_i yields:

$$p_i = DC_i + \frac{U_i}{\epsilon_{EK_i}} * \lambda$$

Using the revenue constraint:

$$Revenues = \sum p_i x_i = \sum \left(DC_i + \frac{U_i}{\epsilon_{EK_i}} * \lambda \right) * x_i$$

And Rearranging to get λ

$$\lambda = \frac{Profit - \sum DC_i * x_i}{\sum \frac{U_i}{\epsilon_{EK_i}} * x_i}$$

Using this, all segment specific prices are calculated. Some further assumptions are made to facilitate the calculation. There is no real feedback loop between prices and quantities as prices are assumed to be fixed from the previous years. For a more detailed explanation, we refer to the documents provided by the main IM¹⁰ and the decisions published by Bundesnetzagentur, for instance the decision about the Track Pricing System 2021.¹¹

¹⁰ https://fahrweg.dbnetze.com/fahrweg-de/kunden/nutzungsbedingungen/nutzungsbedingungen/schienenetz_benutzungsbedingungen/snb_2021-4609716?contentId=1369106

¹¹ https://www.bundesnetzagentur.de/DE/Beschlusskammern/1_GZ/BK10-GZ/2019/2019_bis0199/BK10-19-0178/BK10-19-0178_E_Beschluss_download_bf.pdf?__blob=publicationFile&v=4

5. Great Britain

5.1. Introduction

This case study applies to GB's main IM, Network Rail. ORR is responsible for reviewing the market segments applicable on Network Rail's infrastructure, and approving the mark-ups levied by Network Rail. ORR carries out a review of market segments and mark-ups as part of its periodic review process, which occurs every five years.

This case study outlines the set of mark-ups that are currently paid by train operators for use of Network Rail's network. These mark-ups were set as part of the most recent periodic review in 2018 and remain in place until 2024.

Network Rail levies mark-ups through the imposition of infrastructure cost charges (ICCs):

- PSO operators¹² pay an ICC known as the Fixed Track Access Charge (FTAC).
- Non-PSO operators – known in GB as 'open access' operators – are liable to pay ICCs on the interurban portions of services (i.e., those parts of a service that operate between two major urban areas).
- Freight operators pay an ICC known as the Freight-Specific Charge (FSC) for transporting certain commodities (ESI coal; iron ore; spent nuclear fuel; and ESI biomass).

The remainder of this case study outlines the market segmentation and mark-ups applied within the freight and passenger market. A full summary of the analysis undertaken for the 2018 periodic review can be found in ORR's [infrastructure cost charges conclusions document](#).

5.2. Freight

5.2.1. Market segmentation

For the purposes of setting mark-ups, the GB freight market has historically been segmented by **commodity carried**. This approach to market segmentation is likely to reflect differences in the underlying demand characteristics for rail freight services, which is the basis for an assessment of ability to bear mark-ups.

The data that is necessary to apply mark-ups by commodity is held by Network Rail. Network Rail records the type of commodity carried for each journey on its network, in part because it uses this information to estimate the wear-and-tear impact of traffic (which is affected, among other things, by the load weight of freight traffic). This information also allows for levying mark-ups on a commodity-by-commodity basis.

¹² We use this term in this case study to refer to operators that are commissioned by Governments and other devolved rail authorities to provide passenger services.

The list of commodities is presented in Table 4 below. These commodities capture the major freight traffic flows on the GB network. Some commodities have been further disaggregated into separate market segments, based on their usage, where demand conditions are considered to be appreciably different.

Commodity (market segment)	Further Details
ESI coal	Coal transported to supply the electricity industry
Coal (other)	Coal transported for other purposes
Iron Ore	-
Metals	-
Petroleum and chemicals	-
Intermodal	Freight transported in a container or vehicle, using multiple modes of transportation
Automotive	-
Spent nuclear fuel	-
General distribution	-
Premium mail and logistics	-
Biomass	Product to be used in bio-fuel production
Aggregates	Aggregates, or construction aggregates, is a broad category of materials used in construction

TABLE 4: MARKET SEGMENTS BY COMMODITY CARRIED

ORR reviews the list of commodities every five years, as part of its periodic review, to consider whether they remain appropriate (for instance, whether there are any major new freight flows, or whether any existing commodities should be segmented further due to changes in demand or other market conditions which may affect ability to bear).

5.2.2. Mark-ups

Summary of methodology

The overall approach to setting mark-ups has involved the following steps:

1. The primary piece of evidence used to set mark-ups is some commodity-specific estimates of the elasticity of demand for rail freight with respect to track-access charges (which dates from 2006)
2. Along with consideration of other evidence, this informs a binary judgement as to which commodities can realistically bear a mark-up. Only those commodities where demand is highly inelastic (for example, because it faces little competition from road or other transport modes) are considered able to bear a mark-up. For other market segments, where demand is more elastic and the impact of levying a charge would be

material, ORR has not applied any mark-ups¹³. This means **only a sub-set of freight market segments are liable to pay a mark-up**

3. For those market segments which are considered able to bear a mark-up, further analysis is carried out to understand the specific impact on demand of applying a mark-up. ORR has generally interpreted ability to bear as equivalent to a mark-up that results in a less than 10% modelled reduction in the gross tonne miles shipped by rail (taking account of likely substitution to road). Mark-ups have then been calibrated on this basis.

In the most recent review, ORR concluded that rail freight demand was sufficiently inelastic with respect to charges for **four commodities**: ESI coal; iron ore; spent nuclear fuel; and ESI biomass. A mark-up for the first three of these commodities had been applied in previous reviews, demonstrating that sensitivity to rail charges had not materially changed for these commodities¹⁴. A mark-up for ESI biomass was introduced following an assessment of how demand conditions had changed over time – including as a result of rail-specific investment to transport biomass – followed by some further quantitative analysis (discussed in more detail below).

Demand elasticities

The evidence in step 1 of the methodology described above comes from a [2006 study](#) undertaken by MDS Transmodal (MDST) for ORR. This study drew on MDST's GB Freight Model. This model forecasts road, rail and maritime freight flows based on extensive transport cost data and a mode choice function. It covers a comprehensive range of freight flows by origin, destination, commodity group and, for international cargo, port and / or ferry route chosen, and is calibrated to reproduce actual flows. This model is then used to estimate demand elasticities for each commodity, based on the relative costs of transporting each type of commodity using different transport modes, and the impact on those relativities of an increase in track access charges. The model is assumption-driven and reflects MDST's professional experience and judgment embedded in that model. It does not rely on stated preference methods or interviews with freight end users.

The elasticity estimates derived in this 2006 study have been used in subsequent periodic reviews. In the most recent review, the [assessment under step 2 of the methodology](#) has also drawn on a literature review by [Clark et al. \(2005\)](#) on demand elasticities for different types of freight transport in the USA and Canada, largely as a cross-check against the MDST analysis. This provided some confidence that the commodity-specific elasticity estimates remained valid (though this was only indicative).

Detailed methodology

Step 3 in the methodology described above involves further analysis to understand the specific impact on demand of applying a mark-up. The starting point for this is MDST's historic elasticity estimates, which provide

¹³ In practice, a degree of judgement has been applied at this stage in the process to determine the "threshold" elasticity below which ability to bear mark-ups is low (i.e. zero).

¹⁴ In particular, for spent nuclear fuel, safety issues mean that there is no realistic alternative to transporting this commodity by rail. As such, MDST's analysis attributed an elasticity of zero i.e. perfectly inelastic.

an estimate of the demand response to an increase in track access charges. In subsequent periodic reviews, ORR has undertaken an assessment of factors which may have affected the sensitivity of rail freight demand to charges. This includes: recent evidence on the competitive position of rail freight relative to alternative modes of transport; wider trends in commodity-specific demand for rail freight; and consideration of latest government policy towards specific commodities. Where there is no strong evidence of changes to demand conditions, mark-ups have been maintained at the same level as originally set.

For ESI biomass, MDST's 2006 study did not contain specific estimates of demand elasticity. As such, in the most recent review, ORR commissioned MDST to undertake [further analysis](#) of the impact of introducing a mark-up on demand for rail freight. MDST developed a logit model to simulate biomass producers' choice of transport modes with respect to cost. It then modelled a number of scenarios in which track access charges for rail freight increased. ORR used the results of this analysis to set a mark-up that was forecast to have a moderate (i.e. a less than 10%) impact on overall volumes of biomass transported by rail.

5.3. Passenger – PSO operators

5.3.1. Market segmentation

For the purposes of setting mark-ups, all PSO operators are considered as a single market segment.

5.3.2. Mark-ups

The mark-ups paid by PSO operators are based on an implicit assessment of ability to bear, which takes account of the fact that this charge is effectively passed through to governments or other rail authorities through the contracts that are put in place with these operators¹⁵. This means that the imposition of a mark-up doesn't directly affect decisions by these operators about their level of service provision.

The actual level of mark-ups is set to ensure that Network Rail can recover its total costs, once all other charges have been set and other funding sources have been taken into account (including grants from Governments). This is known as Network Rail's net revenue requirement. Network Rail allocates its total net revenue requirement between all PSO operators, using a model which determines the proportion of fixed network costs that are driven by each operator¹⁶. These costs are then recovered via the Fixed Track Access Charge, which is the specific mark-up paid by PSOs (but effectively passed through to governments and rail authorities, as explained above).

¹⁵ Previously, most PSO operators have held franchise contracts with governments. Operators bid for franchises based on a known level of mark-up the time when they enter into the franchise, and are then held harmless to any subsequent changes in the level of mark-up. Most PSO operators have moved onto contracts which provide for them to be directly reimbursed for certain costs incurred in delivering services (including mark-ups).

¹⁶ Non-avoidable costs are allocated between operators using a EPMU approach. For cost categories where no avoidable costs have been identified, costs are allocated to operators based on the operator's share of specified traffic metrics.

5.4. Passenger – non-PSO operators

5.4.1. Market segmentation

For the purposes of setting mark-ups, non-PSO operators are categorised within two market segments: **interurban** (i.e. services which operate between two major urban areas) and **other**.

A part of a service, between two given stations at least 40 miles apart, is defined as within the interurban market segment if it meets the following criteria:

- at least one of the stations served has average annual entries/exits above 15 million passengers per year, or the station served is within two miles of a station meeting that demand threshold; and
- the other station served has average annual entries/exits above 10 million passengers per year or it is within two miles of a station meeting that demand threshold.

These segments were first defined (and a mark-up on interurban services was first set) as part of ORR's most recent periodic review in 2018. As part of the review, the below market segments were also considered.

- **Domestic versus international services:** ORR decided not to assess the ability of international services to bear a mark-up as they mostly operate on a separate network (and make very limited use of Network Rail's infrastructure).
- **Regular versus occasional services:** ORR decided not to assess the ability of occasional (also referred to as charter) services to bear a mark-up as they represent a very small proportion of total passenger traffic, and gathering the necessary data to investigate ability-to-bear would not be proportionate.
- **Time of day:** the time of day when services operate was identified as an important determinant of demand when assessing market segments. However, the service-level data used by Network Rail (i.e., service codes, which are further described in the detailed methodology below) do not distinguish between the time of day and so this could not be considered further.
- **Journey type:** ORR considered dividing the interurban market segment further into intercity and long-distance commuter, however there were practical difficulties with distinguishing between these segments. Specifically, analysis and practical evidence suggested that the boundary between intercity and long-distance commuter services is not always very precise. As such, defining the single interurban market segment had the advantage that it did not require arbitrary boundaries to be drawn between these two kinds of services, when defining which services belong to which segment.

5.4.2. Mark-ups

Summary of methodology

For the non-PSO passenger market, demand elasticities are not used as they are not available for the individual market segments identified (either at end user or operator level). Instead, ORR has used measures of operators' profitability when running different services, to assess the ability to bear and to set mark-ups.

The primary piece of evidence used is [an analysis of net operating profits](#) for passenger services produced by consultants CEPA and Systra for ORR in 2017. This analysis was split into two stages. Firstly, CEPA and Systra estimated operators' net operating profit across all services (with services categorised by geography and journey type) in order to inform the market segmentation exercise by journey type; in broad terms, services with similar net operating profit were grouped in the same market segment. For market segments identified as having a high profit margin (and therefore the potential ability to bear a mark-up), estimates of net operating profit were then used to model the maximum level of charge that could be levied, without deterring the operation of those services.

The analysis indicated that only **interurban** services had sufficiently high profit margins to bear a mark-up and estimated that services in this the market segment could bear an additional charge of £6 to £7 per train mile. However, there was significant variation in the estimated ability to bear within interurban services.

In setting the mark-up, ORR took account of the above analysis, as well as changes to other charges to be paid by non-PSO operators over the period. ORR set the infrastructure cost charge at a lower level of £4 per train mile. ORR also decided to phase-in the charge over the first five years of the operation of relevant services¹⁷.

Detailed methodology

For the analysis of net operating profit described above, CEPA and Systra drew on a range of information provided by both Network Rail and passenger operators. The analysis was carried out at service code level. Service codes incorporate information about the geographic characteristics of services – i.e. which areas these services run in, and therefore whether these services could be described as suburban, interurban, regional, rural, etc. Furthermore, in practice, Network Rail is able to bill charges according to service code (and has done so with previously applied charges). A service type (i.e. intercity, commuter or other) was also assigned to each service code, as a proxy for journey purpose, using information from an industry demand-forecasting tool (MOIRA).

In the first stage of the analysis¹⁸, net operating profit for services codes was calculated as:

Net revenue = Passenger revenue – staff costs – fuel costs – rolling stock costs – other costs

¹⁷ ORR levied the mark-up only on *new* operators in the interurban market segment. Existing operators in this segment are exempt from the mark-up.

¹⁸ Given there are currently few non-PSO passenger services running on the network (and PSO operators provide the majority of passenger services), CEPA and Systra drew on evidence from all passenger services in their analysis.

The revenue associated with each service code was calculated based on actual train operator revenues, allocated to service codes using industry service code revenue data. Actual cost data was only available at train operator level, so costs were estimated at the service code level. CEPA and Systra did this by estimating linear cost functions¹⁹ for each cost type (staff costs, fuel costs, rolling stock and other costs) using operator level data. The estimated model parameters were then used to obtain predicted costs for each service code. The results indicated that the highest net profits are typically achieved on major intercity routes and long-distance commuter routes (i.e., what we later referred to as interurban services).

For the second stage of analysis, a case study approach was used to assess the ability to bear in more detail, for some of the services that were identified in stage 1 as having a high net operating profit. The analysis sought to model the maximum level of charge that could be levied without deterring an unconstrained operator from operating a new service. This was measured as the difference between the surplus earned by an unconstrained operator for its worst performing train 'diagram' (the full set of movements of a train during the day), and the average surplus earned by existing non-PSO operators.

¹⁹ Cost functions for each cost type were based on either train or vehicle miles and distinguished between power type (diesel and electric) and service type (intercity, commuter and other).

6. Poland

Mark-up is only applied to freight transport by trains of not less than 660 tonnes weight, carrying other than intermodal freight. National regulations do not allow to levy mark-ups on passenger services that depend on public co-financing (PSO).

The IM, in order to apply mark-up is obliged by national and EU regulations to prove that the condition of the market allows it (article 32 paragraph 1 of Directive 2012/34). The market analysis carried out by our main IM showed that the value of the mark-up introduced by him will not cause the takeover of freight by road transport (§21 paragraph 17 of the Decree of the Ministry of Transport and Infrastructure).

Taking the above into account, the IM commissioned market research from specialists employed at the Department of Transport of the Warsaw School of Economics, who, on the basis of a diagnosis of the state of rail transport in Poland, were to determine, among other things, the market segments where mark-up for access charges to rail infrastructure could be applied, and then to determine the price elasticity of demand for different segments of the railroad market. The result of the above mentioned research is "Final Market Research Report", which has been updated twice by the contractor since its inception.

The results of market research led the IM to a conclusion that the level of charges for access to rail infrastructure has a high impact on the passenger transport market, therefore it is not reasonable to introduce a mark-up to passenger transport segment, in turn, outside the intermodal freight segment, the volume of freight is not determined by the level of rail infrastructure access charges, but by macroeconomic factors, which entitles the Railway Undertaking to impose a mark-up on freight transport (except for intermodal), as it has been proven that an increase in access charges in this market segment will not cause freight to be taken over by road trucks. The first update of the Market Research Report ("Market Study Report Update) recommended the IM to set a single, fixed value mark-up charge, independent of line category and gross train weight band, and apply it to non-intermodal trains above a certain weight band (left-closed) to encourage wagonload traffic and attract new freight for the rail transport. The value of the mark-up would, according to the Market Study Report Update, be the difference between the average rate per train-km under the maximum assumptions and the average rate in the draft price list for non-intermodal freight trains above a certain gross weight.

In order to further support dispersed (wagonload) traffic and to determine the weight range above which the IM could apply mark-up, weight ranges not lower than 600 t and not lower than 1100 t were analysed. It was determined that in the predestined segment and predestined weight ranges, the mark-up value could be 4.61 PLN assuming segmentation based on intermodal relief and a mass range not lower than 600 t, or 4.87 PLN assuming segmentation based on intermodal relief and a mass range not lower than 1100 t.

Based on the above results of the study, the IM decided to determine the mark-up charge related to the type of transport performed by a single numerical value, independent of the line category and the gross weight interval of the train, which will be covered by freight trains other than intermodal trains in weight of not lower than 660 t. The value of the mark-up was estimated as the quotient of the difference between the planned revenue from infrastructure access charges according to the Multi-Year Programme (contract between IM and the government) and the reduced revenue of IM resulting from determining the unit access charges rates (basic and

shunting charge) on the basis of direct costs determined according to Regulation 2015/909, and the planned operational work of trains covered by the mark-up

The calculation of the mark-up rate associated with the type of transportation provided is shown in the following table:

Difference between projected revenue according to the Multi-Year Program and reduced revenue as a result of determining the 2018/2019 base and shunting access charges unit rates based on direct costs determined according to EU regulation	66 795 733 PLN
Scheduled operational workload of trains for which the mark-up charge is applicable	52 248 434 train-km
Mark-up related to the type of transportation performed	1,28 PLN/train-km

TABLE 5: MARK-UP CALCULATION POLAND

An amendment to the national regulations from 2018 made it necessary to consider also RU productivity growth in the most recently completed year in determining mark-up. Accordingly, the second update of the "Market Research Report" includes a section on assessing the productivity of RU's.

Given the lack of precise indications regarding the assessment of productivity, IM assessed the productivity of RU's through the prism of financial indicators, the improvement in the value of which was intended to determine whether the condition of the market allows the introduction of a mark-up.

According to the definition, productivity is the ratio of the amount of production produced and sold in a certain period of time to the amount of input resources consumed. Thus, the following measures were used in the analyses conducted:

- total productivity:

- the quotient of revenue and operating costs
- the quotient of operating work and operating costs
- the quotient of operating profit (difference between revenues and operating costs) and costs
- revenue and operating costs

- labour productivity:

- the quotient of revenue and number of employees
- operating profit divided by number of employees

Additionally, the contractor proposed additional indicators depending on the product and on the resources of production factors being a quotient of revenues and: number of gross tonne-kilometers, wagons, traction vehicles, number of employees.

In case of all the above mentioned indicators, on the basis of generally available data, an increase of values was noted, which allowed concluding that there was an increase in the productivity of carriers and the mark-up can still be collected by the IM.

7. Norway

7.1. Introduction

Mark-ups were introduced in Norway in 2019. The content of the relevant article in the Norwegian legislation (jernbaneforskriften § 6-3) is mainly the same as in Directive 2012/34/EU article 32.

Please note that the Norwegian Railway Authority (Statens jernbanetilsyn) does not perform ex-ante control and approval of the market segmentation and mark-up calculation of the infrastructure manager (Bane NOR SF). Hence, the regulatory body has not approved the methods of the IM for mark-up calculation and market segmentation as described below. On the contrary, following a complaint from the Airport Express Train on the subject, the Norwegian Railway Authority made a decision in May 2019 stating that the IM has failed to fulfill the requirements in the regulation for levying mark-ups. This included the regulation regarding both market segmentation and the mark-up calculation itself. The IM filed a lawsuit against the RB, contesting the decision in its entirety. In 2020, the RB won in the district court on all grounds concerning the IMs failing to fulfill the requirements in the regulation on market segmentation and mark-up calculation. However, the ruling has been appealed to the high court by the IM. The appeal has a court date set for November 2021.

The information provided below on how the market segmentation and mark-up calculation has been performed in Norway is based on how the IM has described them in the Network Statement²⁰ 2021 and in the IM's so-called Implementation plan²¹ of July 2017.

7.2. Market segmentation

7.2.1. Overview

The IM's market segmentation in Norway is based on a division of freight and passenger services, and thereafter on a differentiation based on which products/product groups are transported on freight trains and on PSO/non-PSO and destination for passenger trains.

The figure below illustrates the market segments in Norway as identified by the IM:

²⁰ <http://networkstatement.jbv.no/doku.php?id=ns2021en:charges>

²¹ https://www.banenor.no/globalassets/kundeportal/dokumenter/infrastrukturpriser/implementeringsplan_infrastrukturavgifter_20170714_engelsk.pdf

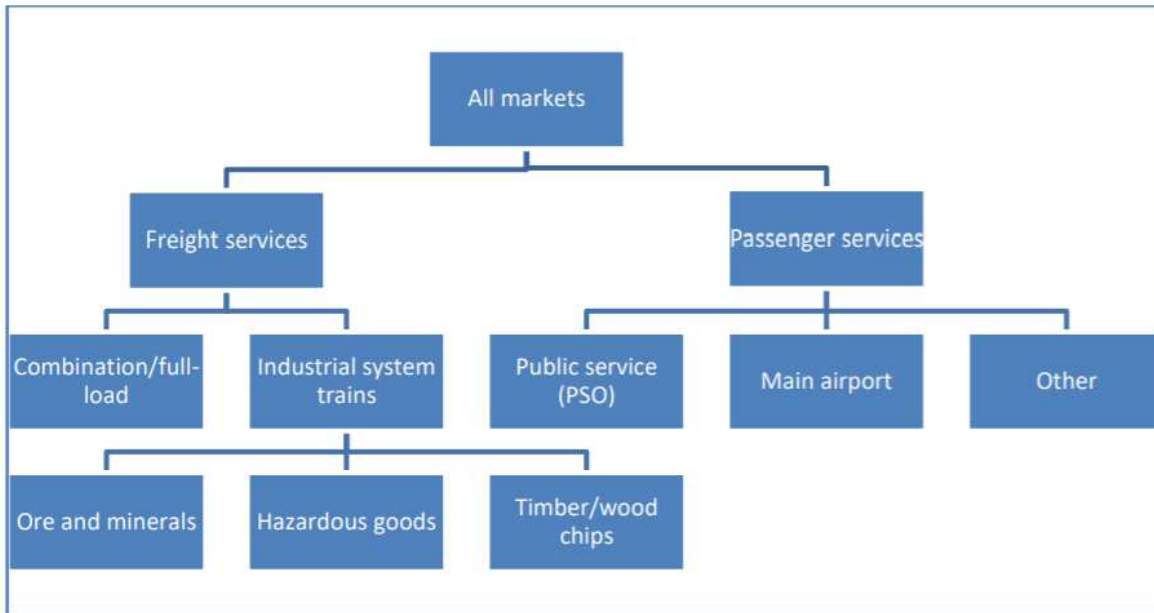


FIGURE 13: NORWEGIAN SEGMENTATION

7.2.2. Segmentation and criteria

According to the IM, they have carried out an internal assessment of the list of pairs that at least has to be considered according to the regulation. They have retained/rejected the following ones:

- passenger versus freight services; Yes
- trains carrying dangerous goods versus other freight trains; Yes
- domestic versus international services; No
- combined transport versus direct trains; No
- urban or regional versus interurban passenger services; No
- block trains versus single wagon load trains; No
- regular versus occasional train services. No

The criteria the IM has used is not clearly stated in the Network Statement or anywhere else to the RB's knowledge.

7.2.3. Mark-up calculation

Methodology Summary

According to the regulation, mark-ups may be levied in order to obtain "full recovery of the costs incurred" by the infrastructure manager. The Norwegian IM has interpreted this to entail that mark-ups may cover both fixed and variable (indirect and direct) operating and maintenance costs on specific parts of the network. The mark-ups are therefore calculated first as a charge that covers fixed and variable operating and maintenance costs on

specific lines. Thereafter, the IM has assessed whether or not the different railway services in the various market segments will be able to bear the mark-up based on publicly available data on profitability. The IM's methodology for mark-up calculation is currently under investigation by the RB following a complaint from LKAB, a Swedish mining company transporting iron ore between Kiruna in Sweden and Narvik in Norway.

Exceptions

Mark-ups are not levied from "combination/wagon load", "dangerous goods" and "timber/wood chips" regarding freight services. Regarding passenger services, mark-ups are not levied from the market segment "other" which according to the IM includes all non-PSO services, except services that routinely arrival and departure at the main airport. These are placed in the market segment "main airport," along with the airport express train. Mark-ups are not levied from these segments because the IM has assessed that they would not be able to bear it.

Mark-ups are levied from the market segment "PSO-services".

8. Sweden

8.1. Market Segmentation

8.1.1. Overview

Trafikverket, the main infrastructure manager in Sweden, divides the market into five market segments:

- High-speed trains (passenger)
- Long-distance intercity trains (passenger)
- Commuter trains (passenger)
- Regional trains (passenger)
- Freight trains

As of the train plan for 2021, passenger trains are divided into four different markets segments. Trafikverket does not make an explicit distinction between PSO and non-PSO trains. However, commuter trains and regional trains mostly consist of PSO-traffic, while the other segments are mostly non-PSO traffic. Freight trains are treated as a single market segment for the purposes of levying mark-ups.²²

8.1.2. Process

Trafikverket is in charge of defining market segments. This is based on established practice and is not specified in any regulation. It is not clear how the list of market segments that Trafikverket uses was derived, but it is likely based on an a priori understanding of the characteristics of the market for railway services. To our knowledge, railway undertakings or other market participants are not involved in the process of determining market segments.

In 2020, Trafikverket informed the Regulatory Body that they plan on reviewing the markets segments every four years. This review will take place as a part of the 12-year national plan for the transport system, when the track access charging system is also reviewed. This national plan is published every four years. The government formally initiates the development of a new national plan. A new national plan for the period 2022-2033 is currently being drafted. A review of the market segments is expected to be made as a part of the preparation of the national plan.

Trafikverket's handling of the segmentation process depends on the manner in which the Article 32(1) of Directive 2012/34/EU has been transposed into national law. The requirement that no market segments are to be excluded from using the infrastructure as a result of the levying of mark-ups has been entered into the Swedish Railway Act. However, the requirement that the infrastructure manager must evaluate the relevance of mark-ups for specific market segments and the process for this stipulated by Annex VI has been transposed by giving the Regulatory Body authority to issue complementary regulation on the matter. The Regulatory Body has

²² Trafikverket Network Statement 2021, p. 76.

not issued any such rules. As a result, the infrastructure managers are currently only required to ensure that no market segments are excluded from using the infrastructure as a result of mark-ups being levied.

8.1.3. Segmentation and Criteria

The market segments that Trafikverket uses and the criteria for determining them are described in the table below.

Category	Market segment	Criteria
Passenger trains	High-speed trains	Certain types of train services are designated as high-speed trains
	Long-distance intercity trains	Night-trains and other trains where the average trip distance of passengers exceeds 100 km, except high-speed trains
	Commuter trains	Commuter trains and other local train services in and around Stockholm, Gothenburg and Malmö
	Regional trains	Other trains where the average trip of passengers does not exceed 100 km, except commuter trains
Freight trains		All freight trains

TABLE 6: MARKET SEGMENTS SWEDEN

8.2. Mark-Up

Methodology Summary

Trafikverket defines those charging components that are not intended to cover direct costs as mark-ups. Trafikverket has an annual revenue target for their track access charges set by the government. Mark-ups are used to cover the gap between the revenues from direct cost charges and the revenue target.

Two components of the charging system are defined as mark-ups. The first is a train-km-based charge levied on trains on certain lines with high capacity utilisation. This charge is levied on all market segments. The second mark-up is a so-called passage charge, a fixed charge levied on passenger trains (including PSO-trains) when they cross certain points surrounding Stockholm, Gothenburg and Malmö during peak hours on weekdays.

Trafikverket does not explicitly analyse if mark-ups per se exclude any market segment from using the infrastructure. Instead, they study the effects of changes to the track access charges as a whole for each market segment every year. Based on calculations of demand changes and financial results of railway undertakings, they conclude that no market segments are excluded from using the infrastructure as a result of mark-ups being levied.

9. The Netherlands

In the Netherlands, the segmentation follows the segments that are described in the Directive: PSO, Non-PSO and freight. In terms of train kilometers, the share of PSO-traffic in 2019 was 93% (153,6 million train kilometers) and the share of freight traffic was 7% (11,2 million train kilometers).²³ A vast majority of the freight trains has an international origin or destination.²⁴ The Non-PSO segment in the Netherlands is negligible. In 2017, the Non-PSO segment amounted to 0,05% of the train kilometers.²⁵

9.1.Process

The segmentation process is described in the Decree Implementation directive 2012/34/EU establishing a single European railway area (hereinafter: Implementation Decree). The process of establishing the list of market segments is initiated at least once every five years by the Ministry of Infrastructure and Water Management (hereinafter: The Ministry). The Ministry directs the infrastructure manager, after consultation with the railway undertakings, to execute the evaluation process that is described in article 32(1) of the Directive, thus referring to the phrase “*the infrastructure managers evaluate their relevance for specific market segments [..]*”. The Decree specifies, in accordance with the Directive, that this list should at least the three following segments: freight services, PSO services and other services.²⁶ The infrastructure manager can further differentiate the list in accordance with article 32(1) and Annex VI of the Directive.²⁷ Thus, the infrastructure manager is not obliged to further differentiate the list. After the list of market segments is determined, the infrastructure determines the mark-up per market segment, which that market segment can bear. The total sum that is collected through the mark-up is determined by the Ministry, in consultation with the infrastructure manager.²⁸ This sum is no higher than the total budgeted costs of the infrastructure manager, minus the direct costs (i.e. charging revenue) of the minimum access package, the infrastructure manager’s revenue of providing services listed in Annex II point 2 in the Directive, and all other revenue related to managing the railway infrastructure.²⁹ Given this sum and the list of market segments, taking into account the evaluation of these segments, the infrastructure manager determines what amount of the sum each market segment can bear³⁰ and determines a cost allocation methodology that ultimately determines the mark-up charge.³¹

The list of market segments, the evaluation of this list and the cost allocation methodology need approval of the RB. This decision of the RB includes a consultation procedure, in which stakeholders can express their views on

²³ Vervoersmonitor 2019, ACM, page 30. See: [Vervoersmonitor 2019 \(acm.nl\)](#)

²⁴ Spoor in Cijfers 2020, Railcargo, page 13: See [RailCargo SIC 2020 web.pdf](#)

²⁵ Rapport can bear test, Significance, page 63. See: [Significance rapport market can bear test \(acm.nl\)](#)

²⁶ Article 11f(1) of the Implementation Decree.

²⁷ Article 11f(3) of the Implementation Decree.

²⁸ Article 11e of the Implementation Decree

²⁹ Article 11d(2) of the Implementation Decree

³⁰ Article 11f(4) of the Implementation Decree.

³¹ Article 11f(5) of the Implementation Decree.

the draft decision of the RB.³² The RB has six months to adopt a decision.³³ The infrastructure manager must request a decision at the RB before the mark-up is published in the network statement. Given this procedure, the infrastructure manager must request this decision far before the mark-up is actually applied. The network statement is published one year before the working timetable³⁴ and the draft network statement, for the consultation procedure with the stakeholders, four months before that. Even though it is not explicitly stated in the Dutch law, the lawmaker intended that the decision is taken before the *draft* network statement. This means, given the six-month decision time of the RB, that the infrastructure manager would need to request approval from the RB 20 months before the mark-up is applied.

9.2.Segmentation and Criteria

The segments that are applied in the Netherlands are:

- PSO services
- Freight services
- Other services

These segments are the same as the minimum segments mentioned in the directive. The following paragraph will discuss the methodology that was applied to investigate further segmentation.

9.3.Final Selection of segments

In August 2018, the ACM has approved the methodology for the mark-up and the list of segments. The infrastructure manager contracted an independent consultancy firm that proposed a mark-up and segmentation methodology. This report is publicly available (in Dutch).³⁵

The report investigated whether extra segments should be introduced. To address this question, three conditions were applied:

1. Are there extra segments within the three main segments that have a substantially different price elasticity?
2. Does the infrastructure manager have sufficient and reliable information to set the mark-up within these extra segments?
3. Are the extra segments of sufficient size?

For the first condition, the price elasticities of different possible segments were compared. These price elasticities were derived from existing discrete choice economical models from the transport sector. These

³² Article 11g of the Implementation Decree and see section 3:4 of the General Administrative Law Act

³³ Although the RB can extend this term a bit for complex matters.

³⁴ Which is four months in advance of the deadline for request for infrastructure capacity, in accordance with article 27(4) of the Directive. In the Netherlands this deadline is in April, so the definitive network statement is published in December.

³⁵ See: [Significance rapport market can bear test \(acm.nl\)](https://www.acm.nl/significance-rapport-market-can-bear-test)

models allow calculating price elasticities for different modes of transport, and for several possible market segments, if the variable defining the segment is in the model. These were all elasticities for end users, i.e. passengers and shippers. The report also compared elasticities from different segments based on a literature study. This was primarily to validate the elasticities from the models.

The second condition focusses on the question whether it is technically possible to apply the mark-up. If the Infrastructure manager is not able to apply the mark-up, it does not make sense to introduce another segment. The third condition is applied when the elasticities are different and practically possible, but the extra segment is so small that it would be inefficient to introduce another segment. In that case, the administrative burden would not outweigh the benefits of adding an additional segment.

In the two table below the investigated segmentations are presented for the freight services and the passenger services and the reasons why they are not applied. Further segmentation for other services were not investigated, because this segment is already extremely small itself.

Segmentation Criterion	Condition Applied	Comment
Freight Services		
Combined Transport	1	Difference between elasticities too small
Commodities	2	IM does not have the information
Distance	2	IM does not have the information about the (international) travel distance ³⁶

TABLE 7: SEGMENTS INVESTIGATED FOR FREIGHT SERVICES

Segmentation Criterion	Condition Applied	Comment
Passenger Services		
Distance	2	IM has no info on distance traveler
Purpose³⁷	2	Different elasticities, but not practical
Urban vs interurban	1	Difference between elasticities too small
Part of the day³⁸	1	Difference between elasticities too small

TABLE 8: SEGMENTS INVESTIGATED FOR PASSENGER SERVICES

There were also two other criteria more elaborately considered, but not further investigated using the economic models. Based on a UK study, elasticities were presented distinguishing between first class, second class with normal tariff and second class with a discount. Also, elasticities were compared of subscription vs. no subscription. These criteria and the found elasticity, however, were strongly correlated with travel purpose. Therefore, these criteria were not further investigated. Furthermore, even if these criteria were further investigated, they would not have met the second condition, because the infrastructure manager does not have information about the passengers and their ticket type.

³⁶ Especially since most freight services are international.

³⁷ E.g. home-work, home-education, home-shopping, work-business

³⁸ Morning, day evening

Following the investigation of the segments, the report recommended to use the three segments mentioned in the directive. The report also expected that no new segments would develop in the period 2020-2024.