

Independent Regulators' Group – Rail

IRG–Rail  
Working Groups Access and Charges

**A survey of congested infrastructure, priority criteria and capacity charges in Europe**

15 November 2019

## Executive summary

This report provides an overview of current rules and practices in IRG-Rail member countries concerning declaration of congestion, charges to reflect scarce capacity, and capacity analyses and capacity enhancement plans.

In directive 2012/34/EU, **declaration of congestion** is very important as it tends to constitute the gateway from the consensus-oriented scheduling and coordination stages of the capacity allocation process, to a stage where the infrastructure manager allocates capacity on the basis of charges or priority criteria. The declaration of congestion moreover activates feedback mechanisms and incentives for the infrastructure manager through the requirement to produce capacity analyses and capacity enhancement plans.

Yet, according to this survey, declaration of congestion *has never taken place* in half of the countries which responded to the questionnaire. In some countries, the reasons for this appear to be absence of capacity conflicts as a consequence of low capacity utilization. In other countries, the most apparent reason is mechanisms in national law, network statements or infrastructure manager practices which enable infrastructure managers to avoid having to declare infrastructure congested. This finding implies that there has been no need to enforce articles 47, 50 and 51 in those countries which have not experienced declaration of congestion.

Moreover, declaration of congestion appears to have *different meanings* in different countries. The occurrence and implications of declaration of congestion will be very different depending on a number of factors:

- How the provision that *capacity requests should be adequately met* has been interpreted.
- To what extent the *reasonable limits* to modification of requests are defined and limit the freedom of infrastructure managers to allocate capacity.
- How sections of congested infrastructure are *delimited in time and space*
- Whether congestion is declared in cases where *temporary capacity restrictions* owing to infrastructure works is the cause of the capacity conflict.

If conflicts between capacity requests cannot be resolved during the coordination phase, employment of **priority criteria** is the most common method for resolving the conflict.

The survey shows that national legislators and infrastructure managers in different countries have made different choices when it comes to forming the priority criteria for capacity allocation, especially in terms of

- defining and making applicable interpretations of *the importance of a service to society* (art. 47.3)
- *what categories the scheme for priority is based on* (e.g. to base priority of type of traffic, type of train path etc.).
- *what is prioritized*
- *at what stage of the allocation process different criteria are used.*

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According to the directive, infrastructure managers may give priority to specific services only as set out in articles 47 and 49, i.e. only following declaration of congestion or designation of specialised infrastructure. In practice, however, most infrastructure managers make decisions on priority also in earlier phases of capacity allocation. This overview suggests that priority criteria are sometimes used

- to condition the scheduling process.
- to informally influence the coordination process.
- for formal decision-making in the coordination stage without declaration of congestion.

Besides priority criteria directive 2012/34/EU presents another means of resolving capacity conflicts: a **charge which reflects the scarcity of capacity**. The survey shows that even though twelve countries have implemented capacity-related charges in some ways, they tend not to be used in practice or only play a minor role in alleviating congestion. While there is both theoretical and legal potential of using the charging system to address issues related to scarce capacity, there appears to exist practical obstacles for using charges and a lack of successful cases to draw upon.

The role of declaration of congestion is not only to resolve capacity conflicts, but also to create incentives for infrastructure managers to find short- and long-term solutions to the capacity shortage through **capacity analyses and capacity enhancement plans**. Since congestion has never been declared in about half the countries, infrastructure managers in these countries have never been obliged to produce these analyses and plans. Even in countries where these plans are published, they do not always contribute to infrastructure development if member states do not enforce the plans or provide adequate funding.

Overall, IRG-Rail finds that there are many challenges concerning congested infrastructure and the related rules covered in this survey. Articles of the directive which are expected to perform important functions in the allocation process are sometimes not implemented at the national level, sometimes not used, and more often than not based on different definitions in different countries.

## I. Introduction

With this report, IRG-Rail has produced a review of current practices referring to congested infrastructure, capacity charges and priority criteria in IRG-Rail member states. This report corresponds to a commitment in the working program 2019 of IRG-Rail Working Group Access. The aim of the report is to provide an accessible overview of current national rules and practices for how to deal with cases when available infrastructure capacity is not sufficient to meet all requests. This corresponds roughly to articles 47, 49–51 and parts of articles 31, 46, and 48 of directive 2012/34/EU.

Directive 2012/34/EU suggests that the first option to solve capacity conflicts should be a charge which reflects the scarcity of capacity of the identifiable section of the infrastructure during periods of congestion (art. 31.4 and 47.3). Following from this, WG Access has developed a collaboration with WG Charges in order to provide a more comprehensive coverage of the issue of capacity conflicts in the case of congested infrastructure.

For the report, WG Access and Charges have created a joint questionnaire which has been distributed to all IRG-Rail members. 26 out of 31 IRG-Rail members have provided input, the non-participants being Bulgaria, Denmark, Ireland, Kosovo and Serbia. On the basis of the questionnaire, some regulatory bodies have been asked to provide extended information on topics of particular interests. This information has been integrated into this report. WG Access and Charges moreover organized a joint workshop on 26 June 2019 in Tällberg in Sweden, where the findings of the questionnaire and an early draft of the report were discussed.

The national rules and practices for declaration of congestion, priority criteria, and capacity analysis and capacity enhancement plans have not been the subject of many previous overviews or research. This report therefore aims at contributing a more detailed picture than previously available and suggest some patterns which may deserve to be studied in more detail.

The outline of the report is as follows:

**Chapter II** presents current rules and practices in different European countries concerning when and how infrastructure is *declared congested*.

**Chapter III** presents how different European member states and infrastructure managers have designed the rules and processes for solving capacity conflicts by means of *priority criteria*.

**Chapter IV** presents an overview of currently existing *charges for scarcity* in the case of congested infrastructure and other charges which are levied and differentiated according to capacity.

**Chapter V** presents the rules and practices in different European countries concerning the *capacity analyses and capacity enhancement plans* which infrastructure managers are obliged to produce following declaration of congestion.

**Chapter VI** takes a forward-looking perspective and deals with *the theoretical case for using charges to solve capacity conflicts* and different ways in which this may be done in the future, given the few cases where such charges have actually been introduced so far.

## II. Declaration of congestion

Article 47.1 of directive 2012/34/EU states that where, after coordination of the requested train paths and consultation with applicants in application of article 46, it is not possible to satisfy requests for infrastructure capacity adequately, the infrastructure manager shall immediately declare that section of infrastructure on which this has occurred to be congested. This shall also be done for infrastructure which can be expected to suffer from insufficient capacity in the near future.

The directive determines that the first part of the allocation process, ranging from the receipt of capacity requests and drafting of the timetable to the coordination phase, has a strong orientation towards consensus and dialogue. The infrastructure manager is obliged to, as far as possible, meet all requests for infrastructure capacity and take account of all constraints on applicants (art. 45.1, p. 2); consult interested parties and take appropriate measures to deal with any concerns that are expressed (art. 45:3–4); attempt, through coordination of the requests, to ensure the best possible matching of all requirements (art. 46.1–2); and attempt, through consultation with the appropriate applicants, to resolve any conflicts and accommodate all requests through coordination and make available a dispute resolution system (art. 46.3, 46:5–6).

Following declaration of congestion, on the contrary, the infrastructure manager is entitled to allocate capacity on the basis of either priority criteria or a charge which reflects the scarcity of capacity, without any formal requirements for consultation or negotiation.

Declaration of congestion moreover triggers a number of requirements on infrastructure managers, the most important being to produce a capacity analysis and a capacity enhancement plan.

### How often is congestion declared in different countries?

A main outcome of the survey is that there is a great variety in how these provisions have been implemented in different countries. In order to provide an overview of how often declaration of congestion is used in different countries, the table below shows the number of declarations of congested infrastructure for the time tables 2014–2019, as reported by the regulatory bodies in the questionnaire.

Country	2014	2015	2016	2017	2018	2019
Italy	0	0	0	0	0	314
Sweden	5	6	4	6	19	12
Romania	4	4	5	6	6	8
Norway	5	3	3	4	5	5
Netherlands	4	0	1	4	8	3
Lithuania	0	0	0	0	2	4
United Kingdom	2	2	2	2	2	2
Austria	1	1	1	1	1	1
Germany	1	1	1	1	1	0
Switzerland	1	0	0	2	0	1
Hungary	0	0	0	0	1	0
Poland	1	0	0	0	0	0
Spain	0	0	0	0	0	3

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Slovenia	0	0	0	0	0	1
Estonia	0	0	0	0	0	0
North Macedonia	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0
Croatia	0	0	0	0	0	0
Finland	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0
France	0	0	0	0	0	0
Latvia	0	0	0	0	0	0
Greece	0	0	0	0	0	0
Portugal	0	0	0	0	0	0

The point of the table is not to allow cross-country comparison, but to suggest that the amount and frequency with which congestion is declared varies substantially between countries.

- In Sweden, Norway, Romania, the Netherlands, and Lithuania (since the 2017 Time Table) declaration of congested infrastructure tends to occur in *more or less every timetable, mostly with several cases*.
- In Italy, there had been *no declaration of congestion until the regulatory body introduced a regulation* on how to calculate the degree of congestion of each major section, and defined thresholds that when exceeded must lead to a declaration of congestion, resulting in 314 macro-sections (not lines) being declared congested for TT 2019.
- In Great Britain<sup>1</sup>, Austria and Germany there has *regularly been one or two declarations of congestion per year*.
- In Hungary, Poland, Slovenia and Switzerland declaration of congested infrastructure has taken place *occasionally, but typically with less than two cases in a single year*.
- Spain had never experienced declaration of congestion until July 2019, when the main infrastructure manager ADIF declared three stations for high-speed lines congested.
- In the remaining countries, declaration of congestion has *never taken place*.
  - (a) In Croatia, Greece, North Macedonia and Portugal the regulatory bodies responded that there is no congestion in the network.
  - (b) In Belgium and France congestion has never been declared despite apparent congestion in the network.

In 13 out of 26 countries congestion has never been declared. In the remaining countries, there is a great variation in current practices. In an attempt to understand the background for this, it might be useful to take a closer look at the results of the questionnaire in terms of the definitions, delimitations and infrastructure managers' approaches concerning congested infrastructure.

<sup>1</sup> In GB a declaration for one timetable years continues into subsequent timetables until congestion has been relieved.

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The questionnaire unfortunately has yielded limited input on the extent to which infrastructure manager make use of the opportunity in the directive to declare infrastructure congested in anticipation of a capacity shortage. This survey will therefore focus on declaration of congestion following the failure to reach an agreement during dispute resolution.

### **How is congested infrastructure defined?**

The questionnaire included a question on the definition of congested infrastructure in each country.

- In many countries, the exact wording of the directive has been transposed into national law (Austria, Croatia, Norway, Slovakia, Sweden and Romania).
- In several other countries the definition in national law is based on the same concept as in the directive, i.e. the applicant's rejection of the infrastructure manager's capacity proposal and the failure of the coordination process, however without using the exact wording of the directive (Czech Republic, Finland, France, Latvia, Lithuania, Luxembourg, Poland, Portugal, Spain and the GB).
- Beside this majority, some countries use definitions based on a ratio between the number of request and the maximum capacity on each line:
  - In Estonia the definition is whether the total volume of requests exceeds the infrastructure flow capacity.
  - In Italy, calculations are made on macro-sections with regards to their theoretical and commercial capacities.
  - In Hungary, declaration occurs when rejected requests exceed 10% of the monthly theoretical capacity.
  - In Germany, assessment is made on the basis of analytical calculations and traffic studies on the performance of railway operations.
  - In the Netherlands, the definition is related to both maximum flow regarding the signalling system, and noise and safety regulations.
- Belgium, Greece, North Macedonia, and Switzerland report that there is no definition of congestion transposed in their national law or network statement.

### **How is congested infrastructure delimited?**

The directive specifies neither how a section of infrastructure should be delimited in space and time, nor for how long the declaration should last. As a consequence, it is up to national legislators and infrastructure managers to provide these delimitations, also in countries which have transposed the definition of congested infrastructure from the directive in national law.

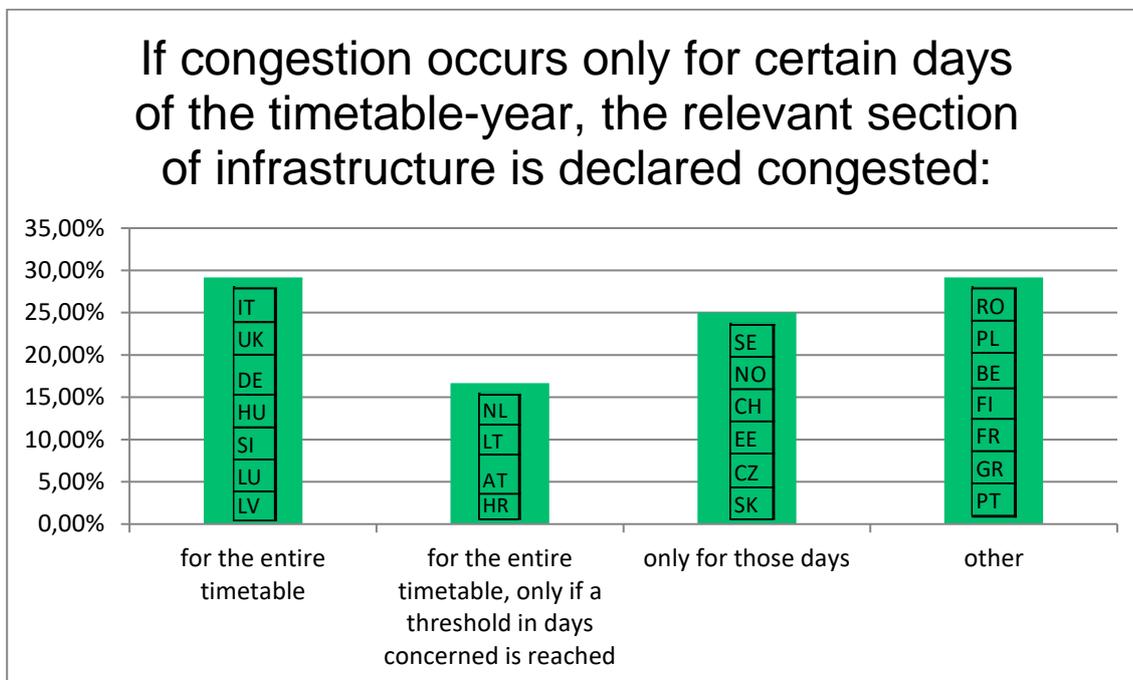
When it comes to the *geographical delimitation* of congested sections, many countries appear to use pre-existing divisions of the railway network into sections (Italy, Latvia, Luxembourg, the Netherlands, Poland, and Sweden). Several other countries use the lines between some clearly identifiable nodes (major switches in France, stations in Lithuania, and stations in an itinerary in Portugal). Other notable answers were:

- In GB the basis is a professional judgment, supported by an internal governance mechanism.
- In Germany, Slovakia, and Switzerland, this is decided case-by-case. In Germany, the infrastructure managers and the competent authorities (the Regulatory Body and the National Safety Agency) jointly decide on a case-by-case basis on the geographical delimitation of congested sections, usually between transport nodes of the railways. In individual case

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decisions, the stations are also declared congested (for example Hamburg-Hauptbahnhof, Berlin-Spandau and Cologne-Central stations).

When it comes to the *temporal delimitation* of congested infrastructure, the survey did not result in answers from all countries, but nevertheless points to a divergence of practices. In France, Italy, the Netherlands, and Sweden there are some rules for the minimum amount of time for the congestion. In France the unit of time for a declaration of congestion is a full hour, from HH:00:00 to HH:59:59. In Sweden there is no formal rule, but the infrastructure manager Trafikverket appears to use a 5-minute interval as the lowest unit of time. In Italy there are hourly and daily thresholds, beyond which the line is declared congested. In the Netherlands, declaration of congestion is based on a so-called Basic Hourly Pattern that is developed for a year and is a general pattern for every single day of the week. The declaration of congestion is linked to a whole day in the Basic Hourly Pattern, and not specified in time. In Finland, the delimitation is from one rejected train path to another rejected train path.



The *duration* of a declaration of congestion also appears to vary between countries. The questionnaire did not result in answers for all countries, but some patterns may be suggested:

- In Germany, Hungary, Italy, Latvia, Luxembourg, Slovenia, and the United Kingdom congestion is declared for the entire timetable. In the United Kingdom, declarations of congestion extend into subsequent timetables. In Germany, sections of congested infrastructure are only detected on the basis of the notified final working timetable and for each working timetable period followed by an annual review.
- In Austria and Lithuania the relevant section of infrastructure is not declared congested if congestion occurs only for certain days of the timetable-year. In Croatia congestion can be declared for a period shorter than 9 months if it is expected that the capacity in question will be requested again.

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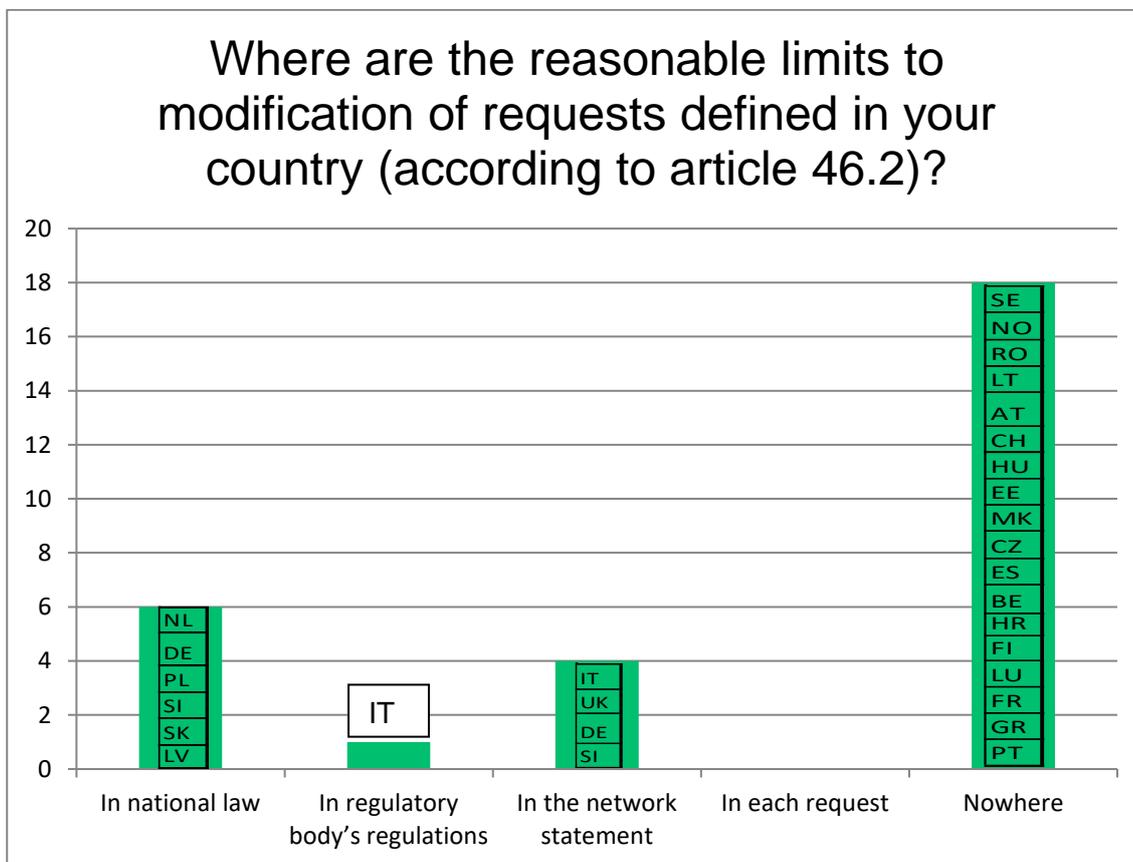
- In Estonia, Czech Republic, Norway, Slovakia, Sweden, and Switzerland, congestion is declared only for those timetable days when the congestion occurs.

This is an important distinction which affects the extent to which congestion will be declared.

**Under what conditions do conflicting requests lead to declaration of congestion?**

One of the reasons for the low number of declarations of congestion even in countries where capacity conflicts exist, may be the possibility for infrastructure managers to claim that capacity offers that differ from the request are nevertheless within reasonable limits according to article 46.2.

In the survey, we asked where the reasonable limits for modification of request are found.



In the majority of countries, the limits have not been specified. This may imply that infrastructure managers may have discretionary powers to set internal rules or decide on a case-by-case basis whether the proposed path offers remain reasonable or not with regards to the expressed needs of the applicants. Often the limits are defined through the choice of the applicant whether to accept the solution proposed.

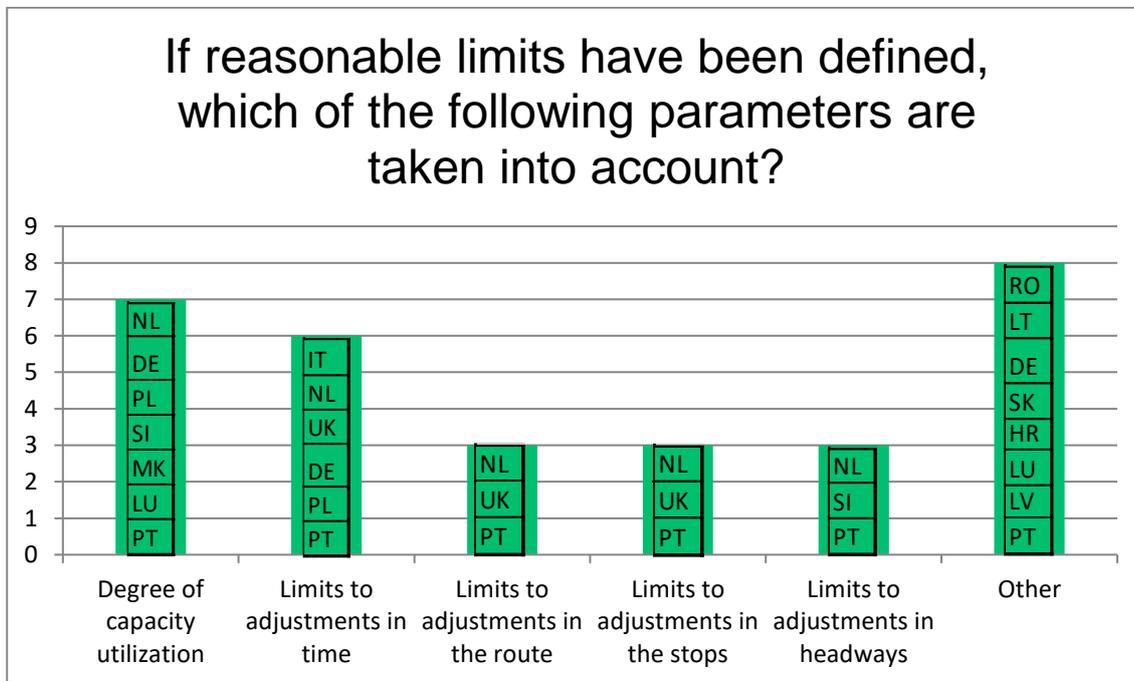
Where reasonable limits are defined, they can be found in

- national law in the Netherlands, Germany, Poland, Slovenia, Slovakia, Latvia
- regulatory body's regulations or decisions in Italy
- the network statement in Italy, United Kingdom, Germany and Slovenia, usually with different times for different types of trains.

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In the few countries where reasonable limits have been defined, they depend on:

- *Degree of train path utilization* in the Netherlands, Germany (if an applicant has not used at least 70% of the train paths in the working timetable offered to him by the IM on request in each of the last two years, this shall also be taken into account in the event of a conflict), Poland, Slovenia, Luxembourg Portugal.
- *Limits to adjustments in time for train paths* in Italy, the Netherlands, United Kingdom, Germany (train path offer may deviate from the design scope stated with 5 minutes for passenger and with 30 minutes for freight trains), Poland, Portugal.
- *Limits to adjustments in the route of train paths* in the Netherlands, United Kingdom, Portugal.
- *Limits to adjustments in the stops of train paths* in the Netherlands, United Kingdom, Portugal.
- *Limits to adjustments in headway or other train path construction rules* in the Netherlands, Slovenia, Portugal.



**Are there safeguards to prevent undue avoidance or abuse of declaration of congestion?**

The contributions to the survey also contained information about safeguards and regulations that prevent infrastructure managers from undue avoidance or abuse of declaration of congestion.

When it comes to the safeguards preventing undue avoidance of declaration of congestion, Italy, Netherlands, United Kingdom, Hungary, Estonia and France report that there are fixed parameters for timetabling which prevents infrastructure managers from e.g. manipulating headway and other train path characteristics. In France there are also limits to the ability of infrastructure managers to offer capacity which deviates from the requested capacity which frame the reasonable limits. In Hungary and the Netherlands this function is supported by IT tools (included in the timetabling tool in the Netherlands). In Austria, the regulatory body may constrain the infrastructure manager to a declaration of congestion. In Germany, a series of process steps (detection, official notification, publication, analysis and assessment and later declaration of congestion) involving the regulatory

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body, the infrastructure manager and the national safety agency as well as railway undertakings lead to declaration of congestion. Spain and Slovakia mentioned the ability of the regulatory body to control the process. So here the two main safeguards remain *fixed parameters for timetabling* and a *legal or regulatory framework* to how far from the request's tolerances reasonable limits mean.

When it comes to the safeguards preventing abuse (i.e. overuse) of declaration of congestion, the *overwhelming pattern is that the regulatory body acts as safeguard*. In the United Kingdom, Germany, Hungary, Slovenia, North Macedonia, and Spain the regulatory body investigates each declaration of congestion. In Austria, the regulatory body receives from the infrastructure manager all the requests that could not be satisfied. In Netherlands, Estonia and Latvia (and probably in most of IRG-Rail members) the regulatory body may receive complaints from applicants who estimate the declaration of congestion is undue.

In addition to this topic, some specific, maybe out-of-scope, yet interesting cases arise:

- In Switzerland, the path allocation body is separate from the infrastructure managers, which prevents from both abuse and avoidance of declaration of congestion (from the infrastructure managers only though, not from the allocation body itself).
- In Romania, there are provisions in the performance scheme that prevent impacts from congestion on the performance scheme.

#### **How do temporary capacity restrictions (TCRs) affect declaration of congestion?**

The regulatory bodies were asked if infrastructure managers declare infrastructure congested also when the cause of congestion is temporary capacity restrictions for infrastructure works. Among the answering IRG-Rail members:

- 39 % answered *yes* (Finland, Latvia, Greece, Hungary, Italy, North Macedonia, Romania, Sweden, Switzerland).
- 61 % answered *no* (Austria, Czech Republic, Croatia, Estonia, France, Germany, Lithuania, Luxemburg, the Netherlands, Portugal, Slovakia, Slovenia, and the United Kingdom).
- In Belgium the issue is still under discussion. In Norway, this information is not part of BaneNORs network statement and the answer is unclear.

In Germany, temporary capacity restrictions for less than six months do not generally lead to a declaration of congestion. For TCRs longer than six months an initial analysis is required if a capacity conflict occurs. However, these cases have so far not been taken into account in the congestion procedure.

IRG-Rail would like to highlight this distinction between countries which limit the concept of congested infrastructure to permanent congestion not caused by infrastructure works, and countries which declare congestion caused by all capacity conflicts including those caused by infrastructure works. It has important implications for the meaning of the concept of congested infrastructure. If the processes for congested infrastructure include cases where TCRs are the cause of the problem, the infrastructure managers will be able to use priority criteria and/or scarcity charges to solve the underlying capacity conflict, but the capacity analyses and capacity enhancement plans may not reflect the long-term capacity shortage. If infrastructure managers do not declare congestion when a TCRs is the reason for the capacity conflict, they will not be able to use priority criteria or scarcity

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charges to solve the capacity conflict, but the capacity analyses and capacity enhancement plans will be more likely to reflect the long-term capacity shortages of the railway system.

### **Conclusions on part II**

The review of the questionnaire concerning declaration of congestion highlights that Member States apply different methods and procedures to assess the performance of railways. This may be a consequence of different political preferences, structural differences, and different approaches of regulation.

About half of the participants reported that the infrastructure managers in their countries have never declared a section of infrastructure congested. In some cases the reason is low capacity utilization and absence of congestion. In some cases, congestion is not declared in spite of apparent congestion in the network.

The numbers on cases of congested infrastructure in the remaining countries vary widely and suggest that the congestion is defined and treated differently in different countries. In an attempt to outline these differences, the survey suggests that

- Definitions of congested infrastructure sometimes follow the wording of the directive, sometimes the spirit of the directive but not the wording, and sometimes a quantification of capacity utilization.
- The delimitation of congested sections of infrastructure in time and space is very different between countries. For example, is congestion be based on an entire line or shorter sections or nodes? Is congestion declared even though the infrastructure is only congested for a short period such as a few days? Do declarations of congestion apply to the entire time-table or only to specific periods of congestion? Does declaration of congestion last into subsequent timetables?
- Whether a capacity conflict leads to declaration of congestion depends on national interpretations of provisions in the directive such as whether a capacity request has been adequately met and what constitutes reasonable limits to modification of a request.
- The treatment of cases where the cause of congestion is TCRs has important implications for the number of cases of congested infrastructure that will be identified, the ability of the infrastructure manager to solve the capacity conflicts, and the role of the capacity analysis and capacity enhancement plan.

### **III. Priority criteria**

If congestion is declared at the end of the coordination phase, the infrastructure manager is obliged to find a solution to the capacity conflict which triggered the declaration of congestion. The formulation in article 47.3 suggests that the primary choice for solving capacity conflicts should be a charge which reflects the scarcity of capacity of the identifiable section of the infrastructure during periods of congestion (art. 31.4). However, in practice most countries in Europe have chosen to go straight from declaration of congestion to allocation of capacity by means of priority criteria. In this report, we therefore discuss priority criteria before scarcity charges, which are the theme of chapter V below.

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The concept of priority in the capacity allocation process appear first in article 45.2 of directive 2012/34(EU), which states that the infrastructure manager *may give priority to specific services* within the scheduling and coordination process *but only as set out in Articles 47 and 49*.

The directive thus appears to limit the role of priority to cases of **congested infrastructure** (article 47) and **specialized infrastructure** (article 49). In the former case, infrastructure managers may employ priority criteria to allocate infrastructure capacity in cases where scarcity charges have not been levied or have not achieved a satisfactory result and the infrastructure has been declared to be congested (art. 47.3). These priority criteria shall take account of the importance of a service to society relative to any other service which will consequently be excluded (art. 47.4). In the latter case, the infrastructure manager may (with some qualifications) designate particular infrastructure for use by specified types of traffic and give priority to this type of traffic when allocating infrastructure capacity.

Directive 2012/34/EU does not state what infrastructure managers should prioritize in case of congested infrastructure. The principal rule is that the priority criteria shall take account of the importance of a service to society relative to any other service which will consequently be excluded (art. 47.4, p. 1). Some further clarification is provided in articles 47.4 and 47.5. The second paragraph of article 47.4 states that the framework for priority shall guarantee the development of adequate transport services, in particular to comply with public-service requirements and promote of the development of national and international rail freight as services which may be given priority. Article 47.5 states that the importance of freight services, and in particular international freight services, shall be given adequate consideration in determining priority criteria.

### **What is given priority and on what ground?**

The directive does not specify the basis for how priority should be determined (besides the requirement to comply with public-service requirement and promote the development of freight). The responses to the questionnaire show that there are different grounds for priority, not seldom within one country. The survey indicates that the open formulations of the directive require that national legislators and/or infrastructure managers elaborate the priority rules at the national level. Article 47.6 states that the procedures to be followed and the criteria to be used where infrastructure is congested shall be set out in the network statement. In our survey, 87 % of the responding RBs confirmed that the priority criteria are found in the network statements. 73 % of RBs responded that priority criteria are found in national law.<sup>2</sup> Some countries do not have priority criteria but rather priority models. In Sweden, the law states that the priority criteria should lead to a socio-economically efficient use of the infrastructure, and the priority model is elaborated by infrastructure managers in an annex to the network statement. In Great Britain, the mainline infrastructure manager Network Rail follows a Code of Practice in identifying and managing Congested Infrastructure. It does not apply any priority criteria or scarcity charges for congested infrastructure. Criteria for capacity allocation are set out in the Network Code (set of rules applicable to infrastructure managers and railway undertakings).

The actions which national legislators and/or infrastructure managers may have to take in order to make the priority criteria applicable can be divided into three tasks:

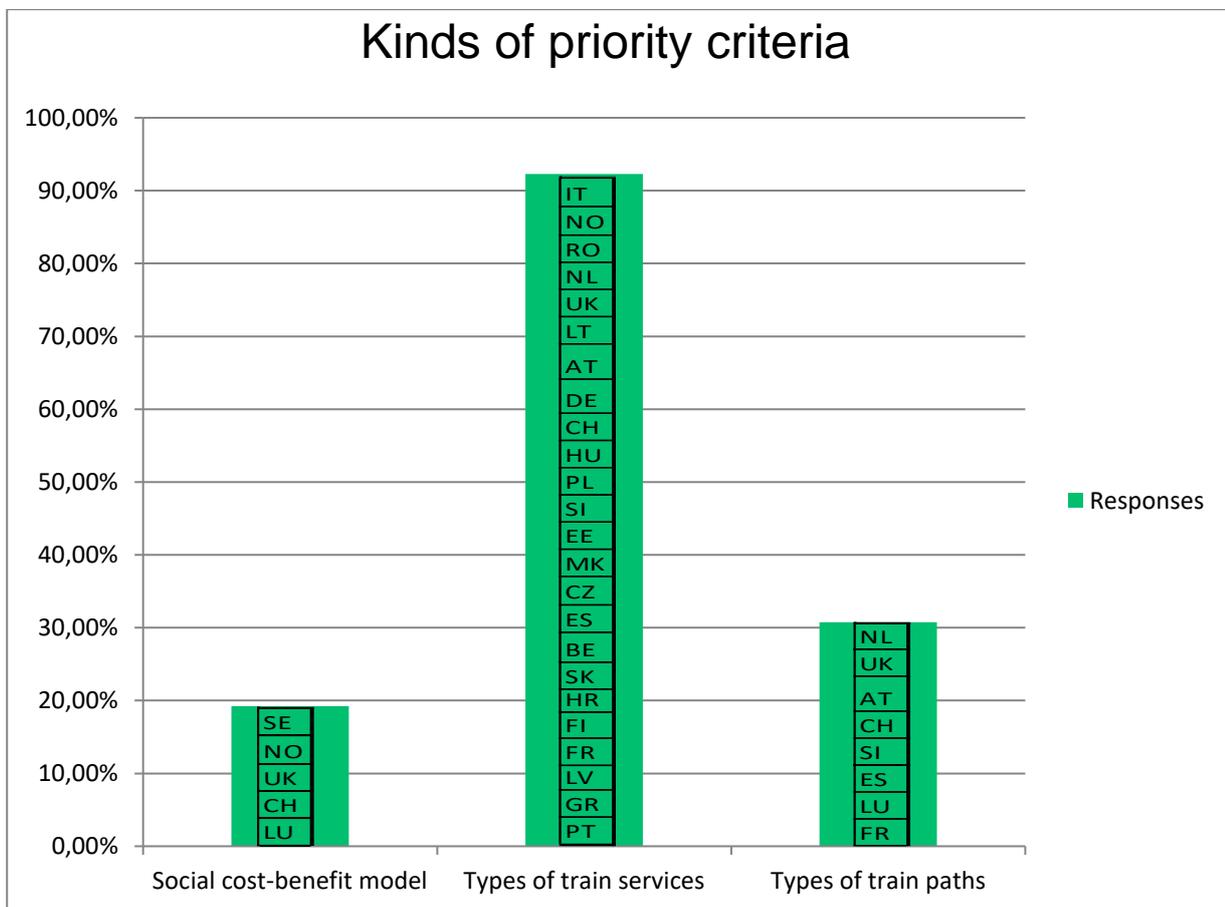
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<sup>2</sup> In the Norwegian case, the priority criteria are defined in national law but also presented in the Network Statement.

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- 1) define and produce practically applicable interpretations of *importance of service to society*
- 2) to set the priorities
- 3) to design the scheme for making priorities.

The first question, of definitions of importance of service to society, was not explicitly covered by the questionnaire. Some examples can nevertheless be mentioned. In Sweden, according to national law the priority criteria must result in a socio-economically efficient use of the infrastructure.<sup>3</sup> In GB, the code of practice includes an objective which serves as the definition of importance of service to society.



By far the most common approach is to give priority to specific types of train services. Priorities for e.g. PSO contracts or international trains exist in more or less all countries (although in Sweden they are implicit and built into the social cost model). The most common practice appears to be to give the highest priority to train services which run under a public service obligation. This is the case in all countries except in Sweden, United Kingdom, and North Macedonia. Another common practice is to prioritize international trains.<sup>4</sup>

<sup>3</sup> The Railway Act (2004:519), 6 ch. 3 §.

<sup>4</sup> This finding is consistent with the data in the RMMS database figure 56.

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A second approach to priority is to base priority on properties of the train path requested, rather than on the type of train service. In France, properties of the train path appear to play a larger role in priority as the main set of criteria. The French system distinguishes between unprepared paths requests, where freight services rank higher than PSO traffic, whereas PSO traffic has access to regular interval paths and pre-built paths which are designed to assure priority for PSO traffic. In Croatia, trains running at regular intervals, for longer time periods, and longer routes are given priority.

A third approach is to base priority on a social cost-benefit model. Only Sweden, Norway, Great Britain, Switzerland and Luxembourg responded that there are elements of social cost-benefit modelling. In Sweden, the wording "take account of the importance of a service to society relative to any other service which will consequently be excluded" has been replaced in national law by the wording "result in a socio-economically efficient use of the infrastructure". As interpreted in Sweden, this does not allow infrastructure managers to make general prioritizations between market segments or in any way preplan or limit path requests made by applicants. The timetable is then built from the path requests, which gives a very large number of conflicts to resolve during scheduling and coordination. If no solution is found by the dispute resolution stage, the infrastructure manager Trafikverket employs a rather elaborate model which attributes a cost to each of the adjustments which are required for different solutions to the timetabling problem. The model estimates the cost of excluding or adjusting the train paths (with a lot of variation in valuation between different market segments and different individual trains), associations with other trains, and the cost for adjusting the plans for carrying out infrastructure works (e.g. additional cost for working night-time or having access only to shorter slots). Trafikverket claim the right to decide what infrastructure works need to be carried out in a single year (and this has not been challenged so far) but the priority model includes decisions on the timing of the works (and by implication some aspects of how to do it). This appears to be a unique feature for Sweden, which may prove hard to reconcile with the rules of the new Annex VII to directive 2012/34/EU as amended by Commission Delegated Decision (EU) 2017/2075, which require that infrastructure managers decide and consult on temporary capacity restrictions long in advance. In Norway the social cost-benefit approach is only used in case of conflicting path request dealing with same type of traffic.

Priority criteria based on train type or train path properties will often result in competing requests being awarded the same priority category. Different countries have developed different strategies for solving such situation, often but not always involving hierarchies of priority concepts. In Belgium, the applicant which pay the higher level of charges is given priority. In Croatia, priority is given to the trains that in the previous timetable had better utilisation of the entire train path for which the request was submitted. For paths of trains that did not exist in the previous timetable, an average utilization degree will apply with respect to the type of train. In France, the infrastructure manager has the right to make a discretionary decision based on equal division of capacity between applicants and if impossible, on a social cost-benefit analysis with regard to the network use. In Poland, priority criteria set in national law have a higher priority than those set in the network statement.

Several countries use a primary and second set of priority criteria. In Finland, Hungary and Portugal train path properties are used to distinguish between conflicting requests within a similar type of service. In France, the order is the opposite with train path properties being the primary set. In Finland the infrastructure manager has criteria which include priority according to frequency of service, long-distance trains (if changes to the timetables of the train travelling longer distances

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would lead to several other changes on the train route), considerations for the number and length of additional stops. Factors taken into account in the coordination of passenger services may include the estimated total number of passengers, the significance of the train in the transport system and the onward connections from the train to other trains and transport modes. The infrastructure manager shall, if necessary, be given information about the volume of passengers for the coordination process. In passenger transport, it can also be assessed how the coordination affects rolling stock and personnel duty rotations, so that these do not cause unreasonable inconvenience for the operators after the coordination. During peak hours, trains running in the congested direction are prioritized. When coordinating freight transport, energy-efficiency in situations with meeting trains should be taken into account. For example, heavy trains should not be stopped repeatedly due to other train traffic. The aim should be to locate meeting trains at traffic operating points where the terrain does not hinder the movements of a slowly arriving or departing train, possibly causing disruptions to other traffic. Trains carrying dangerous goods can only stop for longer periods of time at railway yards designated to handle dangerous goods. In Portugal, there are three tiers of priority criteria. The first tier refers to congested areas and safeguards PSO services. The second tier is based on market segments cross-referenced with peak, regular and off-peak daily time-tables, which yields a “priority score” that should settle conflicting capacity requests. A third tier of priority criteria applies more general priority criteria to capacity requests.

In Germany there is a procedure for defining priority criteria which are decided by assessing the significance of the respective traffic. In one particular case the infrastructure manager DB Netz intended to give priority to local passenger transport over freight transport during peak periods. The regulatory body found this acceptable in principle, arguing that the functionality of the conurbations must be ensured during peak traffic periods.

### **At what stage of the allocation process may priority criteria be employed?**

According to article 47.3, declaration of congestion is a prerequisite for the employment of priority criteria to allocate infrastructure capacity. Given the rules in article 47.1, this implies that there are two occasions when priority criteria can be activated:

- 1) when declaration of congestion takes place immediately after the failure of the coordination phase (art 47.1, first sentence).
- 2) when a section of infrastructure is declared congested since it can be expected to suffer from insufficient capacity in the near future (art 47.1, second sentence).

The survey shows that in most countries where priority criteria are used, they are indeed employed after the failure of the coordination phase.

However, the survey also reveals that infrastructure managers make decision which involve priority before the declaration of congestion. The surveys suggest that priority criteria sometimes:

- *condition the scheduling process* e.g. through affecting the order in which train paths are being constructed (Latvia, Lithuania, Poland, Romania, and Switzerland). In Switzerland the national law contains a broad set of priority criteria for the allocation of train paths on infrastructure where capacity utilization is high but not necessarily congested. In Latvia, the national law includes priority rules which the infrastructure manager has to abide to when

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receiving path requests and drafting the timetable. The infrastructure manager has powers to set a different set of priority rules which applies only to congested infrastructure.

- *inform the coordination process* (but are not formally employed in decision-making) ( the Netherlands, Sweden). In Sweden, the regulatory body Transportstyrelsen has ruled that before declaration of congestion the infrastructure manager can only refer to the priority criteria in order to incentivise applicants to behave constructively during coordination, but not use the priority criteria as the basis for any planning or decision-making.<sup>5</sup> In the Netherlands, the regulatory body ACM is of the opinion that while there is no formal role for priority criteria before declaration of congestion, they nevertheless cast their shadow on the coordination stage.
- *are used for formal decision-making in the coordination stage without declaration of congestion* (Finland, France, and Germany). In France, the main infrastructure manager SNCF Reseau have made provisions in the network statement to apply certain priority criteria without declaring infrastructure congested in the event of failure to reach agreement at the coordination stage. These criteria do not involve specific types of service but rather properties of the requested train path. The first priority is pre-arranged and pre-built paths. For all other requests there are thresholds for the number of days in the TT requested for each path – 50 days – and the length of the requested path – 500 km. SNCF Reseau consider themselves obliged to declare congestion only in cases where the infrastructure manager finds that it cannot allocate all paths within the reasonable limits (according to art. 46.2, see part III above) as specified in the network statement. states this is compliant with the directive, since it only uses priority criteria for certain types of services after declaration of congestion, though criteria based on the properties of the requested paths are applied before, e.g. during the congestion. In Germany, there is a set of priority criteria which are applied during dispute resolution at the end of the coordination stage. Priority is given, in turn, to regular-interval or integrated network services, cross-border train paths, and train paths for freight traffic. In Finland, national law states that the infrastructure manager shall take into account priority criteria for specialised infrastructure and congested infrastructure during the coordination phase, together with e.g. the needs of the passenger and freight sectors as well as track maintenance and optimum use of the railway network.

In Belgium, the infrastructure manager Infrabel has included in the network statement priority rules within the coordination phase. The regulatory body is of the opinion that this is not compatible with national law and has asked Infrabel to change the network statement.

In Germany, priority criteria under Article 47.4 and 5 have never been formally employed. If employed, they would be analysed during the preparation of the capacity-enhancement plan, published in the network statement and approved by the regulatory body after consultation with applicants.

In GB, when the infrastructure manager Network Rail has to make a decision on how to timetable train slots that are in conflict, it does so using published decision criteria (these were agreed with stakeholders and the regulatory body). These decision criteria allow Network Rail to take a range of

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<sup>5</sup> Decision TSJ 2015-4019.

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factors into account when determining priorities in relation to the use of train slots and allocation of capacity. They are detailed in Part D4.6 of the Network Code<sup>6</sup>.

### **How does priority work on specialized infrastructure?**

The basic rule in directive 2012/34/EU is that infrastructure capacity shall be considered to be available for the use of all types of service which conform to the characteristics necessary for operation on the train path (art. 49.1). However, where there are suitable alternative routes, the infrastructure manager may, after consultation with interested parties, designate particular infrastructure for use by specified types of traffic and, where such designation has occurred, the infrastructure manager may give priority to this type of traffic when allocating infrastructure capacity (art. 49.2). Such designation shall not prevent the use of such infrastructure by other types of traffic when capacity is available (art. 49.3).

It appears that infrastructure managers make use of the designation of specialized infrastructure in 15 (e.g. 58 %) of the 26 European countries contributing to this report.

The most salient pattern is that those countries which have built **high-speed lines** use article 49 to reserve these lines for high speed trains (and by implication long-distance passenger trains). Often, some routes are also reserved for freight trains. In Italy, high-speed lines are reserved for high speed, mainly passenger, trains. In GB the only existing high-speed line from London to Folkestone, managed by the HS1 Infrastructure Manager rather than by Network Rail, has been declared specialised infrastructure. HS1 may give priority during capacity allocation in the following order of priority: (a) High Speed International Passenger Trains; (b) High Speed Domestic Passenger Trains; (c) High Speed Freight Trains; and (d) Other Trains. The provision has not been used yet. In France, SNCF Réseau has decided to introduce in its network statement for timetable 2020 a designation of the 2650 kms of high-speed lines as specialized infrastructure for high-speed services, along with an alternative, slower, route from Burgundy to the Mediterranean sea (400km) specialized for freight services. In Spain, the infrastructure manager ADIF declared the main high speed lines as specialized infrastructures in July 2019. The Netherlands has one high-speed line and one dedicated freight line designated specialized infrastructure.

Germany and Austria appear to have the most sophisticated division of the network into different priorities on different sections. DB Netz has designated five high-speed lines and one conventional line for long-distance passenger trains. In most cases the designation is limited to daytime (c. 05-23) and most of the lines are reserved for freight traffic during the night. One ordinary line is reserved for freight traffic during night-time. However, the regulatory body is of the opinion that the importance

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<sup>6</sup> These criteria include:

- (a) maintaining, developing and improving the capability of the Network
- (b) that the spread of services reflects demand
- (c) maintaining and improving train service performance
- (d) that journey times are as short as reasonably possible
- (e) maintaining and improving an integrated system of transport for passengers and goods
- (f) the commercial interests of Network Rail or any Timetable Participant of which Network Rail is aware
- (g) seeking consistency with any relevant Route Utilisation Strategy
- (h) that, as far as possible, International Paths included in the New Working Timetable are not subsequently changed
- (i) mitigating the effect on the environment (j) enabling operators of trains to utilise their assets efficiently
- (k) avoiding changes, as far as possible, to a Strategic Train Slot other than changes which are consistent with the intended purpose of the Strategic Path to which the Strategic Train Slot relates, and
- (l) no International Freight Train Slot included in section A of an International Freight Capacity Notice shall be changed.

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of these priority routes is low, especially with regard to congestion. In Austria, the infrastructure manager ÖBB Infrastructure has a priority for fast passenger trains (>200 kph or sometimes >160 kph) and for long-distance freight trains on new and upgraded high speed lines, where there exists a parallel route. On that parallel route, local and suburban passenger trains and freight trains have priority over long distance passenger trains. Time of day is also a considered. Slovenia has four railway lines designated specialized infrastructure in TT 2020: two for freight and two for cross-border traffic considering particular agreements.

In Finland, Norway, Belgium, and Sweden a small number of short line sections are designated specialized infrastructure for freight or for commuter traffic.

Designating some infrastructure as specialised usually implies prioritising the services on that infrastructure. In Sweden, Norway and Slovenia where requests for non-specialized services are not even allowed. In France and Italy priority on specialized infrastructure also applies to parts of the train path which is not on specialized infrastructure. This does not appear to be the case in other countries with specialized infrastructure.

### **What is the experience of regulatory bodies in monitoring priority criteria?**

Relatively few regulatory bodies report experience of cases relating to priority criteria (Austria, Germany, Lithuania, Norway, Poland and Sweden). However, Belgium, France, Italy, the Netherlands, and Spain report to be currently working on related cases, so we may see an increase in regulatory bodies' activity on priority issues. The themes which have been explored by regulatory bodies include

- 1) Investigations of possible non-discriminatory consequences of priority criteria
- 2) Analysis of priority criteria as part of preparations for liberalisation
- 3) Documentation requirements on infrastructure manager's employment of priority criteria

Roughly half of respondents report that there is some sort of requirement on infrastructure managers to document the application of priority criteria.

In Lithuania, Norway, and Sweden the regulatory body has interpreted the requirement in article 39.1 that the infrastructure manager shall ensure that infrastructure capacity is allocated in a fair and non-discriminatory manner and in accordance with Union law, to imply a requirement on infrastructure managers to document their decisions regarding capacity allocation, including when allocating capacity using priority criteria. The Norwegian regulatory body has used the national legislation equivalent of article 39 (1) to impose requirements to document capacity allocation decisions, most recently following a complaint in 2017. In Sweden, this issue has been raised by the regulatory body in five decisions, most recently in 2019. In 2016 the regulatory body instructed the infrastructure manager Trafikverket to produce documentation to show how they arrive at the solution to priority conflicts, including input data, which alternatives have been compared and why these alternatives were chosen i.e. a full analysis of the application of priority criteria for future timetables.

In Germany, a series of preliminary process steps (Ex-Ante Regulation) involving the regulatory body, infrastructure managers and the national safety authority as well as railway undertakings lead to the declaration of congestion. From the stakeholders' perspective the congestion procedure has increased transparency, especially since the legal revision of the regulatory framework in 2016. Since then the applicants have one month to comment on rules and priority criteria in the network

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statement and also on the draft capacity-enhancement plan. However, beyond transparency, the effect of congestion procedures after the process are limited because the capacity enhancement plan does not need to be approved. This means in Germany there is no legal obligation to implement the proposed measures in order to improve operational quality and, above all, capacity.

### **Conclusions on part III**

The directive 2012/34/EU leaves a lot of room for national legislators and infrastructure managers to design and apply the priority criteria. This has given rise to different designs for priority in different countries. The most common approach appears to be to give priority to specific types of train services (notably services running under PSO contracts and international services). Another common practice is to base priority on the type of train path requested (e.g. length, number of running days, regular service or not). Other practices include the Swedish social cost-benefit model and the British decision criteria.

Another finding is that while article 45 of the directive states that priority may only be given after declaration of congestion or designation of specialised infrastructure, in practice some kind of priority criteria play an active part outside these conditions in the scheduling and coordination phases of the capacity allocation, either through formal priorities or through informal influence on the processes.

## **IV. Charges related to capacity**

According to article 31.4, the infrastructure may include a charge which reflects the scarcity of capacity of the identifiable section of the infrastructure during periods of congestion. Article 47.3 indicates that such charges should be the primary option in cases of congestion:

Where charges in accordance with Article 31(4) have not been levied or have not achieved a satisfactory result and the infrastructure has been declared to be congested, the infrastructure manager may, in addition, employ priority criteria to allocate infrastructure capacity.

### **What are the benefits of charges to use capacity conflicts?**

Railway capacity is a finite resource, and lines occasionally become congested in times of high demand. Using track access charges to ration scarce railway capacity may be a way to deal with congestion. By charging more for trains running on congested infrastructure, infrastructure managers may enable a more efficient use of the network. Directive 2012/34/EU includes provisions for using the charging system to address scarcity and congestion, e.g. by allowing an extra charge for congested infrastructure under Article 31 (4).

However, designing an effective capacity-related charge in practice is difficult. The complexity of designing timetables, the physical characteristics of the railway system, and the fact that access charges in general are a weak cost driver for railway undertakings complicates designing a charge

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that actually alleviates problems of congestion.<sup>7</sup> Only a minority of the IRG Rail member states surveyed in this study use the charging system to target congestion directly.

The directive allows three ways of using track access charges to capture the cost of capacity constraints:

1. *a charge that reflects the scarcity of capacity of the identifiable section of the infrastructure during periods of congestion* (art. 31.4). Article 47.3 suggests that such charges should be the primary option to resolve cases of conflicting patch requests:
2. *a direct cost charge that reflects the marginal cost of adding another train* under article 31.3. Direct cost charges might also be differentiated so that the charge is higher for highly used track sections, which could be seen as a capacity related charging component. However, this is foremost meant to recover increased direct costs of a more intense usage, not to recover the capacity costs of this intense usage. These options are limited by provisions in Implementing Regulation EU 2015/909 on direct costs, which states that direct costs must be just that: directly incurred by the operation of a train service. If the additional costs incurred during times of congestion are related to e.g. staff costs, they may be charged as a part of the charges under article 31.3 of Directive 2012/34/EU. External costs associated with congestion, e.g. costs imposed on other applicants, would need to be charged under article 31.4.
3. *a higher level of track access charges for specific future investment projects* (art. 32.3)

Other charges levied by infrastructure managers may also influence capacity utilisation, but are not included in this study:

- charges levied as a part of a *performance scheme* as in Article 35 of the Directive 2012/34/EU. We do not consider these as capacity-related charges because they are levied *ex post*, although they have a similar goal in mind.
- *reservation charges*, which are sometimes mentioned in the context of capacity-related charges. Reservation charges are covered in a separate paper by IRG Rail.<sup>8</sup>

### **Which countries have introduced charges which are only levied on congested infrastructure?**

Only Austria, Czech Republic, Estonia, Luxemburg, and Norway have implemented charges which are levied only on congested infrastructure. It is moreover unclear if they actually play a major part in solving capacity conflicts in any of these countries.

- In Luxemburg, the infrastructure manager has a charge that is calculated on the basis of a congestion factor product, the length of the section declared to be congested, a rigidity coefficient and a reservation time coefficient. The rigidity coefficient depends on the difference between the basic running of the train and the running of the train as estimated on the basis of the application of the service timetable. The reservation time coefficient depends

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<sup>7</sup> See e.g. Messulam, P. & Finger, M. (2014). Rail Access Charges. In Finger, M. and Messulam, P. (Eds.), *Rail Economics, Policy and Regulation in Europe* for a discussion on the practical concerns of using the charging systems to address problems of congested infrastructure.

<sup>8</sup> IRG Rail (2019), Review of Reservation Charges Across IRG Rail Member States. IRG-Rail (18) xx. Forthcoming.

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on the time included between the initial request for the train path made by the railway undertaking to the allocation body and the scheduled date for the first train path in question.

- In the Czech Republic, normal track access charges can be doubled in cases of congestion.
- In Norway, the infrastructure manager levies a fixed charge of NOK 500 for all train paths affected by declaration of congestion. The rationale for the charge is to internalize the cost of scarce capacity in the railway undertakings. "If there are a number of train companies/groups on the same section, any capacity cost is not internalised. The purpose of a capacity charge is to internalise the capacity cost in the train companies'/groups' own business administration. This brings about consistency between socio-economic and business-related correct allocation of capacity. The capacity charge is similar to congestion charging on roads." "As long as the capacity in this area is not auctioned off, the charge will indicate to relevant applicants that passing through this area at certain times of the day will cost the applicant more. The charge is applicable to all applicants and all types of train; also including empty trains getting into position."<sup>9</sup>
- In Austria, there is a supplementary charge for congested infrastructure. The charge is applied in times of congestion (morning and evening) only for a 12 km long line. Since 2013, only one part of a line has been congested.
- In Switzerland, the priority mechanism involves auctions since 2011. The highest bidder gets the path. If the highest bidding is more than CHF 1000 higher than the second one, the infrastructure manager sets the price for the path to the amount of the second highest bidding + CHF 1000. Congestion moreover has an impact on cancellation fees. Cancellation fees are usually owed from the first day after the definitive allocation of a train path. In cases of congested infrastructure the railway undertaking is obliged to pay a cancellation fee from five days after the provisional allocation of a train path.
- Estonia, Poland and Slovenia have also implemented auctions as a means of solving capacity conflicts. However, the system has never been put into practice in either of the countries. In Poland, the regulatory body UTK has observed that railway undertakings are reluctant to pay the higher charges which would follow from an auction and instead so far have preferred to accept the required adaptations in the coordination phase. The UTK suggests that the rules need to change in order to lower the threshold for declaration of congestion. In Estonia, capacity allocation by means of auctioning only involves those train paths that are not given priority according to the priority rules.

Among the countries which have not yet introduced congestion charges, several report that there exist or have existed efforts to introduce such charges. In France, there is currently a discussion regarding the possible introduction of either of the three following options:

1. an auction process for non-RFC pre-arranged paths (as the one introduced in Germany), after implementing the coordination process and before applying the priority rules
2. random draw process for non-RFC pre-arranged paths
3. a scarcity charge that would take the form of a peak/ off-peak modulation for all paths.

In Sweden, Trafikverket introduced in the network statement for 2011 a scheme for using second-price auctions to differentiate between conflicting requests which could not be resolved by priority criteria. However, the scheme was withdrawn after protests from the railway undertakings.

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<sup>9</sup> BaneNOR Network Statement 2020, chapter 6.2.1.1.2.

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Transportstyrelsen has urged Trafikverket to look further into different models for using economic incentives to force applicants to reveal their real valuation of the train path. This is a requirement if the priority model is to meet the analytical criteria for social efficiency, which is the basis for capacity allocation in Sweden.<sup>10</sup>

In Germany, the regulatory body sees a limited potential for capacity charges. Passenger services have to serve passengers if transport needs are to be met satisfactorily. Freight traffic cannot use many alternative routes (train parameters, tunnel cross-sections, gradients, etc.) and new connections are often expensive due to excessively long detours or later journeys.

### **Which countries have other charges related to capacity but not to declaration of congested infrastructure**

Only three countries currently apply (Sweden, Netherlands) or until recently applied (GB) capacity-related charges that are unrelated to declaration of congestion.

The main Swedish IM Trafikverket includes two charging components related to capacity utilisation and congestion. One is the train path charge, which is modulated according to the average utilisation rate of the line. The charge is based on train-km and has three levels. The charge is motivated by the fact that lines with higher utilisation entail higher costs for the infrastructure manager, beyond higher costs for e.g. wear and tear that would be captured by other charging components.<sup>11</sup> The other is a passage fee, levied during peak hours on weekdays around three stations: Stockholm, Gothenburg and Malmö central stations. The charge is a flat charge of SEK 433 per train in 2019 and 2020.<sup>12</sup>

In the Netherlands, the infrastructure manager has the option of applying a fixed capacity surcharge of €100 if there is no settlement after coordination when there are competing capacity requests. If the surcharge is not applied, or the charge fails to resolve the conflict, the infrastructure manager declares the infrastructure to be congested. In 2018, the surcharge was never applied despite 8 declarations of congestion.

The GB charging scheme previously included a capacity charge related to the marginal cost of adding an extra train to the network. As stated in a study from 2018, “[i]t should be stressed that what is being measured for the British capacity charge is not the cost of delays caused directly or indirectly by unreliability of the extra train itself; those costs are charged for as part of the performance regime. Rather it is the reduced ability of the system to recover from delays, brought about by the extra train, even if it is not in itself the cause of delays”.<sup>13</sup> The GB regulatory body decided to remove the capacity charge in 2017. The change came into effect from 1 April 2019.

The decision to remove the capacity charge in the GB is explained in a document summarizing the conclusions of the 2018 periodic review: “the available evidence suggests that the incentive effects of the current capacity charge are relatively weak. In particular, it is calculated in a way that does not provide a strong link between the level of the charge and either congestion or the impact on end

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<sup>10</sup> See e.g. CTS working paper 2014:4.

<sup>11</sup> Trafikverket network statement 2019, section 6.3.1.2.

<sup>12</sup> Trafikverket network statement 2019, section 6.3.1.3.

<sup>13</sup> CERRE (2018). Track access charges: reconciling conflicting objectives.

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users (passengers or freight customers). Furthermore, the complexity of the charge looks to be a significant barrier to stakeholders responding to it in practice.”<sup>14</sup>

### **Conclusions on part IV**

Using the charging system to address issues of congestion has both a strong theoretical appeal, and is also foreseen by Directive 2012/34/EU. Indeed, using a charge under Article 31 (4) should be the first step to resolve conflicting capacity requests according to Article 47 (3), before priority criteria are employed.

The work conducted by IRG-Rail Working Group Access and Charges and presented in this chapter, shows that the charging system, including auctions, is rarely used to address congestion. Even though twelve countries have implemented capacity-related charges in some ways, in many countries they are not used in practice and in the rest they play a minor role in alleviating congestion. As far as we are aware, GB is the only country which has carried out a review of the types of charges covered in this chapter GB concluded that its capacity charge was ineffective and confusing and therefore phased it out.

Our work suggests that while there is both theoretical and legal potential of using the charging system to address issues related to scarce capacity, there are obstacles for using it in practice. Furthermore, there is a lack of successful case studies on which to draw inspiration for developing these charges in other countries.

## **V. Capacity analyses and capacity enhancement plans**

Articles 50 and 51 of directive 2012/34/EU includes a rather elaborate scheme for providing feedback to the infrastructure planning and improvement process when a section of infrastructure is declared congested.

In the first step, a capacity analysis shall be completed within six months of the identification of infrastructure as congested (art. 50.3). The objective of capacity analysis is to determine the constraints on infrastructure capacity which prevent requests for capacity from being adequately met, and to propose methods of enabling additional requests to be satisfied. The capacity analysis shall identify the reasons for the congestion and what measures might be taken in the short and medium term to ease the congestion (art. 50.1). The capacity analysis shall consider the infrastructure, the operating procedures, the nature of the different services operating and the effect of all these factors on infrastructure capacity. Measures to be considered shall include in particular rerouting services, retiming services, speed alterations and infrastructure improvements. (art. 50.2).

In a second step, the infrastructure manager shall produce a capacity- enhancement plan within six months of the completion of a capacity analysis (art. 51.1). A capacity-enhancement plan means a measure or series of measures with a calendar for their implementation which aim to alleviate the capacity constraints which led to the declaration of an element of infrastructure as 'congested

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<sup>14</sup> ORR (2017), Charges and contractual incentives – consultation conclusions, p. 15. [https://orr.gov.uk/data/assets/pdf\\_file/0008/24992/conclusions-on-consultation-on-charges-and-contractual-incentives-june-2017.pdf](https://orr.gov.uk/data/assets/pdf_file/0008/24992/conclusions-on-consultation-on-charges-and-contractual-incentives-june-2017.pdf)

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infrastructure (art. 3 (21)). A capacity-enhancement plan shall be developed after consultation with users of the relevant congested infrastructure. It shall identify:

- a. the reasons for the congestion;
- b. the likely future development of traffic;
- c. the constraints on infrastructure development;
- d. the options and costs for capacity enhancement, including likely changes to access charges.

Based on a cost benefit analysis of the possible measures identified, it shall also determine the action to be taken to enhance infrastructure capacity, including a timetable for implementing the measures. The plan may be subject to prior approval by the Member State (art. 51.2).

These arrangements may potentially perform an important function by providing feedback to infrastructure development process and create incentives for infrastructure manager to take measures to ensure that available capacity meets the demands of users.

However, since congestion has not been declared in half of the countries capacity analyses and capacity enhancement plans have not been activated in many countries. Even in countries, where they have been produced, they have to be published and brought into the general processes for planning and funding infrastructure improvements.

#### **What are the rules on publication, approval and consultation?**

As for publication, there appears to be three commonly used practices:

- for *the infrastructure manager to publish* the documents, either on its website or directly in the network statement or both.
- publication *not specified*
- In the last third of the European countries, these documents are *not public* and are provided only to the Member State, the regulatory body or the applicants.

Spain appears to be alone in publishing the capacity enhancement plan directly on the Member State website.

The provision in the directive to allow the member state to approve the capacity analysis and enhancement plans is used by less than 45 % of countries, with three main cases:

- *plans are approved by the Ministry* (six countries): The role of the Ministry is more or less precise in each country (for instance, in Belgium, the approval is needed only if the Member State partly or fully finances the works and is done by “the cabinet” ; in France and the GB, there is a 2 months (resp. 1 month) deadline for approval; and in Slovenia, the approval is not needed but highly recommended because the Member State finances the plan and should be involved in the decision process.
- Plans are approved by the regulatory body or the NSA (Estonia and Portugal).
- Approval is needed but has not yet been specified (2 countries).

Nearly two thirds of the respondent could not provide information on the consultation process. In other countries practices include:

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- *formal public consultation* in 5 countries (with or without an online publishing or a direct link in the NS),
- *survey* on the plan in 3 countries (Hungary, the GB, and Portugal)
- *regular meetings* with applicants in 3 countries
- *a private correspondence to designated parties* (Ministry, RUs, RB) in Switzerland
- no consultation (Lithuania)

#### **What is the link between capacity enhancement plans, path allocation process, priority criteria, and scarcity charges?**

According to Article 51 of the Recast, a capacity enhancement plan shall determine the action to be taken to enhance infrastructure capacity. In practice, these measures can take various ways such as general efforts to increase capacity, plans for investments, operational measures, the designation of specialized infrastructures, among others.

The most interesting ideas emerging from the questionnaire are:

- Operational measures from *Italy* to try to improve capacity without infrastructure investments: modification of itineraries, path speed changes, path reprogramming, specialization of lines...
- Route utilization strategies or long-term schemes from the *GB* and *Switzerland*. In the GB, these are called the "long-term planning process" (LTPP) strategy and it fulfills the IM obligations to plan the future capability of the network. The LTPP looks at the long-term capability of the network up to 30 years into the future to promote efficient use of network capability and capacity. This document provides a 'menu' of enhancement options that have a strategic fit with the national network and can be progressed for further development.
- Modification of the priority criteria in *France* to modify capacity sharing and improve it if possible (not yet applied in practice)
- Identification of railway bottlenecks in Portugal, so that capacity enhancement plans act like a preference criterium to select infrastructure work locations.

In Finland, Italy, the Netherlands, Portugal and Slovakia there appears to be some degree of functioning feedback from congestion to investment planning via capacity analysis and capacity enhancement plans. However, in neither of these countries these measures appear to play a major part in the planning of infrastructure works.

In Germany, the congestion procedure has increased transparency, especially since the legal revision of the regulatory framework. Since then the applicants have one month to comment on the draft capacity-enhancement plan. For example, planned traffic restrictions once led to fierce political resistance. Beyond transparency, the effect of congestion procedures is limited because capacity enhancement plan does not need to be approved. This means there is no legal obligation to implement the proposed measures in order to improve operational quality and, above all, capacity.

In Sweden, when the Railway Law was introduced in 2004, the legislator was of the opinion that the usual plans for investment in infrastructure also could function as capacity enhancement plans or at least serve as the foundation for them (prop. 2003/04:123, p. 120). In practice they appear not to have been taken into account at all.

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No respondent reported that the failure to produce or follow a capacity enhancement plan has ever resulted in an infrastructure manager ceasing to levy charges for congested infrastructure.

In almost 60 % of countries, there is no direct link between the measures in capacity enhancement plans and the relevant funding. In the dozen countries which have such links, they consist of

- Assignment of funding from the Member State (possibly with a long-term view)
- Cost-benefit analysis to study and finance a cost-effective solution (the Netherlands)
- European Union funding in some specific cases (e.g. Railway Freight Corridor rehabilitation in Romania)

### **What is the experience of regulatory bodies in monitoring capacity analyses and capacity enhancement plans?**

Only a few regulatory bodies reported on experience of capacity analyses and capacity enhancement plans. In Sweden and the Netherlands, the regulatory bodies have taken decisions determining that the main infrastructure managers have failed to produce the plans in time. Germany has also detected poor capacity plans in terms of proposed measures and implementation of them, mostly due to a complex procedure. In Spain and Poland, the infrastructure manager does not wait for congestion to launch capacity enhancement plans, on its own initiative.

The subject of TCRs and their potential links with congestion is also addressed in a few countries (4) *via* the capacity enhancement plans. Indeed, TCRs are specifically taken into account when designing the appropriate measures in Romania and The Netherlands. In France these plans are mandatory – while declaration of congestion is not – when the main motive that prevents path allocation is TCRs.

### **Conclusions on part V**

In at least 10 of the countries the capacity analysis and capacity enhancement plans have not been activated since infrastructure manager do not use declaration of congestion.

In the remaining countries there does not seem to be any hard requirements that these measures are taken into account in the planning and funding of infrastructure improvements. Financing these plans seems to be one of the biggest issue so far for each member state, with various ideas emerging to solve that: approval from the government, cost-benefit analysis, or the removal of scarcity charges on the designated line if the infrastructure manager does not make any progress with the actions identified in the enhancement plan, though this last measure has never been used yet by any country.

One important distinction is the link between infrastructure works and congestion. In some countries, such as France, the IM does not declare infrastructure congested when TCRs are the main motive that prevent path allocation (during the relevant hours of traffic interruption).

In other countries, notably Sweden, where infrastructure works are the main cause of congestion, capacity analysis and capacity enhancement plans tend to reflect the geographical locations of major infrastructure works rather than general capacity shortages.

## VI. The theoretical case for and against the use of charges to resolve capacity conflicts

### Costs of congested infrastructure and how to charge for them

Charging systems pursue different sets of objectives. As expressed by Nash (2000)<sup>15</sup>, these objectives go from promoting the efficient use of, and investment in, infrastructure, to cost recovery and promotion of efficiency of operators. In addition, other objectives apply, such as harmonisation of competition terms between modes of transport. This view was shared by the European Commission in its White Paper (1998)<sup>16</sup>, stating that in order to achieve such objectives, the approach to charges shall follow different basic concepts, such as “[c]harges should be directly related to the costs that users impose on the infrastructure”, or “charges should encourage greater efficiency in the use of transport infrastructure”.

When it comes to congested infrastructure, the charging system may also be said to pursue multiple objectives. On the one hand, charges may be seen as a way to allocate capacity among applicants. By allowing charges to vary with the level of infrastructure use, the party with the highest willingness to pay for the train path would be allowed to use it. This view is also evident in the proposal to Directive 2001/14/EG, a predecessor to Directive 2012/34/EU. In the proposal, the Commission writes that “[t]here is an obvious relationship between the charges which are levied for access to scarce capacity and the allocation of that capacity among bidders. Ideally, charges should be set at a level to reflect the opportunity cost for the infrastructure manager of traffic which is priced off the network. Then, in theory, for a given infrastructure, there should be no allocation problem since bids for capacity should not exceed that which can be made available.”<sup>17</sup>

On the other hand, costs associated with congested infrastructure may be seen within the framework of social marginal costs. Adding an additional train to the infrastructure may, in times of congestion, impose costs on other users and the infrastructure manager. As long as lines are not close to their maximum, the marginal cost of adding another train to the system should be fully captured by charges based on marginal costs (after all, every additional train pays charges that should cover the cost to which they give rise). However, when the demand for capacity is at or near the maximum capacity for a line, other costs come into play. Absent a charge targeting such costs, they will not be fully internalized by the applicant. By charging for these external costs, railway undertakings meet the full cost of using capacity. Trains whose benefits are lower than the social marginal cost would then be discouraged from using the infrastructure.

### Costs associated with high capacity utilisation

Following the discussion above, we define three different types of costs associated with congested infrastructure.

The first is scarcity cost: the opportunity costs of demand that cannot be met by the existing capacity, or demand that is modified due to constraints of the existing capacity. This definition follows the spirit

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<sup>15</sup> Nash, Chris & Niskanen, Esko. (2000). Helsinki Workshop on Infrastructure Charging on Railways 31 Jul. (Rail Infrastructure Pricing Key issues and experience from Britain).

<sup>16</sup> EC-European Commission. (1998). Fair Payment for Infrastructure Use: A phased approach to a common transport infrastructure charging framework in the EU. *COM (1998), 466*.

<sup>17</sup> COM(1998) 480, p. 37.

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of the CERRE Report on Track Access Charges from 2018 that highlights the difference of railways networks compared to road networks “in that the capacity problem is solved beforehand, i.e. queues never materialize when trains are running on time. The annually updated time-table is the explicit realization of how scarcity is handled, establishing the departure-arrival patterns that are permitted during the upcoming year.”<sup>18</sup> This cost is difficult to estimate, because we cannot observe the difference of the hypothetical demand without any capacity constraint compared to the realized demand.

The second cost may be called congestion cost. Adding another train when the traffic on a network is close to its maximum capacity increases the risks of trains not running on time. Additional trains reduce the ability of the system to recover from delays, even if the single additional train is not the main cause of the delay. Congestion thus imposes costs through time delays and unreliability on users.

Congestion and scarcity costs are sometimes used interchangeably. For the purposes of this paper, we choose to distinguish between the two. While congestion costs arise from delays due to trains' intensive use of infrastructure, scarcity implies that infrastructure is so congested that a train running a path prevents another train from even running its path or forces the operator to take an inferior path. These outcomes generate costs for the operators and for the rail system as a whole, which might suffer a reduction in its ability to recover from delays. Therefore, congestion and scarcity produce external costs. These costs, when accounted for, fall within the category of social marginal costs. Both of these costs are mentioned as components of social marginal costs by the EU White Paper on Fair Payment for Infrastructure Use<sup>19</sup> as costs that should be the base level of the track charge.

A third cost is the additional costs borne by the infrastructure manager as capacity utilization approaches its limit.<sup>20</sup> As capacity utilisation increases, it becomes more difficult to gain access to the infrastructure in order to perform maintenance. Maintenance may have to be shifted to nights when the cost of labour is higher, or be divided up into several stages, both of which increases costs. More pre-emptive maintenance also needs to be undertaken, although this applies in general as traffic increases and may not be isolated to cases of congested infrastructure. These increases in maintenance cost are reflected in the increased marginal cost of the infrastructure.

There are other costs related to congestion that can arise as a result of an action of the infrastructure manager. In order to increase capacity the IM shall elaborate a capacity-enhancement plan that might consider investing in new infrastructure or in enhancing and upscaling the lines. Although these investments, that pursue to increase efficiency, are part of the normal business development, they involve certain long-term costs that are undeniably tied to the existing situation of a congested line, given that the investment would not have been undertaken in the absence of congestion.

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<sup>18</sup> CERRE (2018), Track access charge: Reconciling conflicting objectives, p. 15.

<sup>19</sup> EC-European Commission. (1998). Fair Payment for Infrastructure Use: A phased approach to a common transport infrastructure charging framework in the EU. *COM (1998), 466.*, p. 8

<sup>20</sup> Odolinski, K. & Boysen, H. E., 2018. Railway line capacity utilisation and its impact on maintenance costs, *Working papers in Transport Economics* 2018:10, CTS - Centre for Transport Studies Stockholm (KTH and VTI).

### **Charging for congested infrastructure**

There are at least two main options charging for the costs associated with congested infrastructure. The first is through an auctioning process, where applicants are invited to bid for one or several train paths. The second is through higher charges that reflect the additional cost associated with congestion and scarcity.

Incomes from charges for scarcity or congestion may be used to finance fixed costs, as they do not reflect out of pocket spending for the infrastructure manager. This is also highlighted in the White Paper.<sup>21</sup>

#### ***Auctions***

An auction system may be used to allocate railway capacity, where a given train path is awarded to the highest bidder. In theory, an auction would internalise the scarcity cost mentioned above and ensure that the train path is allocated to the use with the highest social benefit. In practice, auctions are rarely used (see below). This is often explained by the fact that it would be computationally impossible to apply an auction to all slots in a timetable due to the complexity of the allocation process. Proposals for how to incorporate elements of auctioning into time table design have been around for decades.<sup>22</sup> Alternatively, auctions could be applied only for lines that have been declared congested.

#### ***Congestion charging***

A congestion charge applies to situations of intensive capacity utilization and focusses on the costs related to congestion or scarcity of capacity in the rail infrastructure, as opposed to infrastructure direct costs. Such charges could be set within a marginal cost framework to cover congestion and scarcity costs. Infrastructure managers may also define a target level of capacity utilisation for a line, and then iteratively adjust the charge until that level is achieved.<sup>23</sup>

This charge could be used to clear the market, thus achieving a more efficient path allocation by increasing the price. Nevertheless, according to Article 51 of Directive 2012/34/EU, it might rather be conceived as a temporary solution. This article foresees that the IM shall develop a capacity-enhancement plan that aims at solving congestion by increasing capacity. The third paragraph states that the IM shall cease levying this charge if it does not develop the plan or does not make progress with the identified actions. Therefore, both the absence of a capacity-enhancement plan or its successful enhancement will terminate the application of the congestion charge.

#### ***Higher level of charges***

Although not related to higher direct cost due to increasing maintenance cost or to social marginal costs that arise with congestion, Article 32 (3) of Directive allows the IM to set charges at a higher level (above direct cost) on the basis of long-term costs of specific future investment projects that aim at increasing efficiency or cost-effectiveness. These investment projects might be due to a situation of congestion in a line that requires enhancements to meet the whole demand for paths.

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<sup>21</sup> COM(1998) 466 final, p. 50.

<sup>22</sup> See e.g. Nilsson (2001), Towards a welfare-enhancing process to manage railway infrastructure access

<sup>23</sup> CERRE (2018). Track access charges: reconciling conflicting objectives.

### **Critique of using the charging system to target capacity utilisation**

Using charges to ration scarce railway capacity is theoretically appealing. However, there are at least two issues that may prevent track access charges and other economic instruments from acting as effective price signals to address congestion<sup>24</sup>:

The first has to do with the heterogeneity of slots and complexity of timetable design. It may be tempting to view access charges as a price in a spot market, where sought-after slots would sell for a higher price than less attractive ones. However, train paths are heterogeneous and not easily substituted. Moving a train path from one time of day to another is not always feasible, one reason being that the value of a train path depends on what other train path an RU receives. Mixing different trains on a line, e.g. slow-running freight or commuter trains with high-speed intercity trains, could significantly reduce capacity due to physical constraints of the line. Train path construction thus becomes a complex, combinatorial exercise.

The second challenge is due to the insensitivity to cost changes due to modulating track access charges. Using track access charge to reduce peak demand would work only if the consumers' demand is sensitive to price changes. If congestion is due to large amounts of commuter traffic, raising track access charge is unlikely to have any effect on traffic volumes as commuters are generally not sensitive to price changes. Long-distance passenger and freight transport may be more elastic due to competition from other transport modes. However, that competition may lead to modal shift rather than moving demand to other times, which may not be desirable. Furthermore, the cost pressure from charge modulation may be too weak compared to other economic factors. Optimal use of rolling stock and crew will weigh heavier than minimising charges, even in countries with high levels of charges: "Operators will be mostly concerned with having sufficient successive paths for a train and its crew so that they can reuse both, at best without idle time or the need for a crew change, even if they have to pay a hefty extra RAC to run back on the return journey"<sup>25</sup>.

Nevertheless, charging for congestion could still be appropriate even if it does not solve the situation of congestion on a line by clearing the market. As mentioned before, congestion increases direct social costs borne by the IM and the railway system as a whole. Therefore, this charge aims at recovering these increasing costs. This is the reason why Article 51.4 allows the IM to continue levying the congestion charge, subject to the approval of the RB, if the capacity-enhancement plan cannot be realised for reasons beyond its control or the options available are not economically or financially viable.

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<sup>24</sup> Messulam, P. & Finger, M. (2014). Rail Access Charges. In Finger, M. and Messulam, P. (Eds.), *Rail Economics, Policy and Regulation in Europe*.

<sup>25</sup> Messulam, P. & Finger, M. (2014). Rail Access Charges. In Finger, M. and Messulam, P. (Eds.), *Rail Economics, Policy and Regulation in Europe*, p. 331.

# **Annex: aggregate questionnaire answers (multiple choice-questions only)**

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