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Contents

List of acronyms

ACI Europe	Airports Council International Europe
ADIF	Administrador de Infraestructuras Ferroviarias
ADIF AV	Administrador de Infraestructuras Ferroviarias Alta Velocidad
AGCM	Autorità garante della concorrenza e del mercato
BEREC	Body of European Regulators for Electronic Communications
CJEU	Court of Justice of the European Union
CNMC	Comisión Nacional de los Mercados y la Competencia
CO_2	Carbon Dioxide
COVID-19	Coronavirus disease 2019
ENTSO-E	European Association for the Cooperation of Transmission System Operators
ERA	European Union Agency for Railways
EU	European Union
EU ETS	European Union Emission Trading System
EUR	Euro
IM	Infrastructure Manager
IRG-Rail	Independent Regulator's Group Rail
IT	Information Technology
MAP	Minimum Access Package
NTV	Nuovo Trasporto Viaggiatori
PRIME	Platform for Rail Infrastructure Managers in Europe
PSO	Pubic Service Obligation
RFC	Rail Freight Corridors
RFI	Rete Ferroviaria Italiana
RU	Railway Undertaking
SFO	Service Facility Operator
SNCF	La Société Nationale des Chemins de fer Français
TCR	Temporary Capacity Restrictions
TFEU	Treaty on the Functioning of the European Union
TRKM	Train kilometers
TTR	Timetabling and Capacity Redesign
UIC	International Union of Railways
UK	United Kingdom
VIP	Very Important Person

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Presentation

The scope of this report is to identify the current challenges in the EU railways regulatory framework. With the implementation of the Fourth Railway Package the process of structural reform of the EU railways sector was completed. The present moment, characterised by the consolidation of the new market structure, the emergence of competition, particularly in the passenger services segment, and the imperative to decarbonise transport by means of shifting a significant share of traffic to rail, and therefore increasing the capacity of the system, offers a timely opportunity to identify the areas needing improvement, as well as the best practices to be reinforced.

The International Union of Railways (UIC) has created in 2021 a Working Group in its Intercity and High-Speed committee (ICHSC) for the analysis of the current regulatory challenges stemming from the implementation of the Fourth Railway Package. The ICHSC collaborates and supports also universities through its Alliance of Universities for High-Speed Rail (AUHSR) and selected the Transport Area of the Florence School of Regulation (FSR) in Florence, Italy for their background and expertise but also as a respected institution in the European commission regarding regulation matters. A series of four dedicated workshops were held in the course of 2022, covering 12 different topics identified as requiring further discussion and clarification, and involving the active participation of a select group of experts. The main takeaways and recommendations stemming from these discussions have been captured in this report.

A final fifth workshop in October 2022 was devoted to the presentation of the report to a wider audience, including public authorities and a broader set of representatives, while providing an additional opportunity for stakeholder reactions and discussions.

We thank all the individuals and organizations who actively participated in the workshops and provided the information for the drafting of the report.

Executive summary

The adoption of the **Fourth Railway Package** by the European Union in 2016 intended to prepare the ground for competition in the sector while ensuring it is well equipped to accommodate the necessary growth in line with the EU transport decarbonisation objectives.

More than five years following its adoption, we are offered a timely opportunity to take stock of the progress made and evaluate the implementation of the Package. This report endeavours to identify best practices in order to support the smooth application of the existing framework and pave the way for a future-proof Single European Railway Area, while pinpointing loopholes, divergences and challenges in the interpretation of the existing framework.

Special attention has been devoted to three issues: 1) access to rail infrastructure, in particular in case of congestion; 2) access to service facilities; and 3) the economic framework, particularly the incentives for new investment.

1. Access to rail infrastructure in a competitive environment

The EU regulatory framework on access to rail infrastructure has been effectively implemented. Infrastructure Managers have been separated from Railway Undertakings, and non-discrimination is ensured through a detailed capacity allocation procedure under the supervision of national Regulatory Bodies.

However, **three challenges** persist in the regulatory framework on access to rail infrastructure:

- First, the allocation of **capacity for international services** is still a major roadblock. Capacity is allocated at national or subnational level by each Infrastructure Manager, and the coordination instruments in the Directive 2012/34/EU (Recast Directive) and Regulation (EU) No 913/2010 on Rail Freight Corridors, fall short of guaranteeing proper access to capacity for cross-border services.

- Second, allocation of capacity in case of **congestion** poses even more pressing challenges. The EU procedures for congested infrastructure are not being fully applied as congestion declaration is still very rare across the EU. Furthermore, the EU framework does not define priority criteria for the allocation of scarce capacity, whereas national rules are not only divergent, but also insufficiently clear. Newcomers perceive capacity as a barrier to entry. Head-to-head competition with the incumbent is not possible in the most popular routes if the newcomers can only have access to spare rail paths.

- Third, the management of **Temporary Capacity Restrictions** has been a problem, as capacity allocation is too often disrupted by works on the infrastructure. The Commission reacted with the adoption of Commission Delegated Decision (EU) 2017/2075, which is slowly improving the situation.

As competition puts growing pressure to solve these issues, some **best practices** can be identified across Europe, and in particular in those Member States marked by higher degrees of competition. Even if they are very different, they share a common theme: a more **active management** of the infrastructure by the Infrastructure Managers, either at a national or a European scale.

- An **active construction of a timetable for cross-border services** by the coordinated effort of Infrastructure Managers at a European level in the framework of the Timetable Redesign (TTR).

- A **more active management of congestion** has been implemented in **Italy**. On the one hand, the line of intervention has been advanced, and the Infrastructure Manager declares congestion

before saturation is reached, as soon as capacity is limited (as a result, the number of segments declared congested is higher: 314 in 2019) allowing for solutions to be designed well in advance. On the other hand, clear and more sophisticated priority rules have been defined, which do not result in absolute preferences for one service over another, but rather in the preferred typology of service only having the right to use 60 percent of the available capacity in a given time bracket.

- **Prearraged packages of paths** are increasingly prebuilt at regular intervals at a national level. An example can be identified in France, but it is the Infrastructure Manager in **Spain** who has taken a more active role: they optimised the timetable for high-speed services, created three packages of train paths and put them for **tender** in the form of framework agreements. As a result, three Railway Undertakings can compete in the provision of high-speed services.

- A **more active management of Temporary Capacity Restrictions** (TCRs) is being implemented as a result of the adoption of Commission Delegated Decision (EU) 2017/2075. Infrastructure Managers are working in the framework of RailNetEurope to harmonise the application of the regulation on TCRs: advance the moment in which TCRs are made public and take into consideration the systemic effect of the TCRs, not just in the network.

All these initiatives confirm a change in paradigm: Infrastructure Managers are not merely passively reacting to access requests by Railway Undertakings and, more broadly, to events such as congestion or Temporary Capacity Restrictions. On the contrary, they are expected to **actively manage the infrastructure**: creating pre-arrange paths and timetables both at a national and European level and planning more proactively in advance the reaction to events such as congestion or construction works. Equally important, they are increasingly expected to adopt a **systemic approach**, taking into consideration the interests of all players in the ecosystem: incumbent and newcomer Railway Undertakings, Service Facility Operators, etc. This evolution is emerging to **overcome fragmentation**. A more active management of infrastructure allows to overcome the challenges posed by the fragmented ecosystem of players: Railways Undertakings, Service Facility Operators, etc. Only Infrastructure Managers are in the position to become the system integrators through the active management of infrastructure. Furthermore, collaboration among Infrastructure Managers allows to overcome the challenges posed by fragmentation across national borders.

2. Service facilities

Other than access to rail infrastructure, Railway Undertakings need access to a series of auxiliary spaces and services in order to provide their transport services. The Recast Directive regulates such services under the header of “service facilities”. Such regulation faces the following **five challenges**:

- First, the **borderline between service facilities and rail infrastructure** is not always straightforward, and the interpretation of the Court of Justice of the European Union is being requested. There is a strong divergence across Member States, as the same type of asset or service might be operated by an Infrastructure Manager, a Railway Undertakings or a third party. The difference is relevant, as the access regulation is different (for instance on pricing).

- Second, **very different physical spaces and services** are included in the category of “service facilities” as defined in the Recast Directive: passenger stations, freight terminals, terminals in ports, and maintenance facilities. Furthermore, it also includes the rail-related services provided in such spaces, such as maintenance services, cleaning and washing, etc. Even if different regulatory obligations are imposed on service facilities and rail-related services according to the typology created in the Recast Directive, reality has proven too heterogeneous to be accommodated in the scarce content dedicated to service facilities in the Recast Directive. Though Commission Implementing Regulation (EU) 2017/2177, provides some guidance, loopholes remain, i.e., on access to passenger stations and maintenance facilities and services.

- Third, there is a severe **divergence in the application** of the EU regulatory framework across Member States. Regulation is not as detailed as the rules on track capacity allocation, so implementation has left more space for Member States to set their own rules.
- Fourth, the **regulation of traction current** is a good example of divergence across Member States, and it is becoming particularly relevant in the current context of rising electricity prices, where Infrastructure Managers and Railway Undertakings are exploring new options to control a cost that is becoming a heavy burden and even a barrier to market entry.
- Fifth, **competition poses specific challenges**. Incumbents and newcomers compete for the same spaces. Maintenance facilities often need to be placed near large stations in scarce and expensive land around metropolitan areas. The main stations have limited space for all the services required by Railway Undertakings (from parking to ticketing, etc.). The existing regulatory framework lacks clear rules for the allocation of space in service facilities.

Once more, some best practices can be identified. Infrastructure Managers in countries with a more vigorous competition are increasingly opting for a **more active management of service facilities**.

- "**Station utilisation plans**" are drafted in **Italy** by the Infrastructure Manager RFI for the larger stations (i.e., those with more than 50 passenger services per day), after consultation with the interested parties and updated annually. A more active management by the station operator can reduce friction by proactively identifying Railway Undertakings' needs, optimising the available capacity, and ensuring *ex ante* that such demands are met in a transparent and non-discriminatory manner.
- The **station operator resumed the provision of services** in **Spain**, as it was identified after consultations that scarce space in the station does not allow for each Railway Undertaking to provide its own services. This has been the case for: 1) logistics to load and unload onboard services (mostly food and drinks); and 2) assistance to passengers with reduced mobility.
- No best practice seems to emerge yet on the management of **traction current**. While it is common for Infrastructure Managers to provide the service (i.e., acquire the electricity in the market and sell it to Railway Undertakings), in some countries the Infrastructure Manager generates electricity on its own and sells it to the Railway Undertakings, and in some countries, Railway Undertakings directly acquire electricity in the market without the intervention of the Infrastructure Manager.

Competition is pushing to the limits the regulation of service facilities, and in the countries with more competition in passenger services, facility operators are responding with a more active management of the facility: definition of plans for the utilisation of the facility, and even the operation by the operator of services previously operated by the incumbent Railway Undertaking, to facilitate non-discrimination and market entry.

3. The economic framework

The EU rail directives created a completely new economic framework for the sector, with regulated track access charges as the corner stone. The Recast Directive defines common rules for the definition of track access charges and prices for the use of service facilities. However, despite harmonisation, **five challenges remain**:

1. First, there are very significant **divergences** in the charging principles and the actual charges set in the different Member States for access to rail infrastructure and service facilities, despite the common rules defined in the Recast Directive. Divergences in prices reveal underlying divergences across fundamental issues on the funding of the sector. Some Member States grant

more public subsidies to rail infrastructure and therefore, they enable lower track access charges and lower prices for passengers and shippers. The same applies to some service facilities such as stations. Other Member States aim to recover a high portion of costs through such charges.

2. Second, divergent financial models are an **obstacle to cross-border services**. Calculating the total cost of running through different infrastructures can be complex, but not an obstacle to the provision of the service. The obstacle can derive from the fact that some Infrastructure Managers charge high track access charges, and such costs may prove challenging to bear by a cross-border service which cannot always be funded through underdeveloped cross-border PSO schemes. Night trains are a good example.

3. Third, the **balance of accounts** of the Infrastructure Manager imposed on Member States in the Recast Directive is not always respected. Furthermore, the actual institutional framework might be misaligned, as national Regulatory Bodies have powers to supervise access prices, and tend to keep them low, but they have no mandate to enforce the balance of accounts.

4. Fourth, there are no clear rules on **discounts to promote traffic**, particularly as competition emerges and Infrastructure Managers are considering discounts such as those existing in aviation to promote traffic.

5. Fifth, **new investment** is not effectively promoted in the regulatory framework, which seems more focused on regulating access prices for the promotion of access to existing assets. However, as modal shift objectives require more capacity in rail infrastructure, a long-term policy to promote new investment will be necessary. When regulating access prices, it is important to balance the interest to reduce barriers to entry against the interest to promote the development of the network. This is particularly relevant at this very moment, where the European Green Deal requires a substantial increase in the capacity for rail passenger and freight transport.

In terms of best practices, there are different ways of funding the sector, and in particular rail infrastructure. Access charges can aim to cover a high portion of costs or not, but in any case, the accounts of Infrastructure Managers have to be balanced, and regulation has to provide the right incentives to invest in new infrastructure, particularly in service facilities provided in competition such as maintenance facilities and freight terminals.

4. Conclusions

As a conclusion, it is possible to identify that, after the implementation of the Fourth Railway Package, there are four major challenges for the completion of the Single European Railway Area, the emergence of a competitive industry and for meeting the objectives of the Green Deal:

- First, there are **loopholes** in the legislation, and more important, there are major **divergences** in the implementation of the existing EU rules, even in the most basic rules on access to infrastructure and pricing. The regulatory framework is being put to the test as competition emerges, and the loopholes and divergences are becoming more prominent.

- Second, **cross-border services** face too many obstacles. These services offer the most obvious opportunities for modal shift and growth. A series of initiatives are underway to reinforce cooperation among Infrastructure Managers: Rail Freight Corridors, and collaboration in RailNetEurope, for instance, to produce the Guidelines on Temporary Capacity Restrictions or for the construction of the Timetable Redesign). Reinforcing collaboration among Infrastructure Managers first, and the then with the rest of the sector (Railway Undertakings and Service Facility Operators) seems to be the most appropriate way forward.

- Third, there is **congestion** in significant segments of the EU rail infrastructure and service facilities, such as in major passenger stations. The regulatory framework does not provide clear rules for the management of congestion, particularly when newcomers enter the market, so congestion is becoming a very relevant barrier to entry for newcomers.

- Fourth, the regulatory framework does not provide **incentives for investment** in new infrastructure. The rules and the institutional framework do not effectively ensure the balance of accounts for the Infrastructure Managers, necessary to meet investment needs for the development of new infrastructure, nor the incentive to invest in new service facilities. This is a relevant issue, as the modal shift planned in the Green Deal requires a major increase in the capacity of the rail network.

In order to meet these challenges, rather than a review of the existing EU Directives, what seems necessary is a **closer collaboration** among all players for a more convergent implementation of the existing rules.

- Loopholes and divergences in the legislation can be reduced if Infrastructure Managers make an extra effort to **converge in the application of the existing rules**, with the support and supervision of national Regulatory Bodies and national Governments.

- Congestion and operative challenges in cross-border services are being reduced with more **active infrastructure management**. There is more pre-planning of the use of infrastructure: international and national track paths, even the creation of pre-arranged paths by the Infrastructure Managers, more pre-planning of reactions to congestion in rail infrastructure, of Temporary Capacity Restrictions, of capacity in stations, and so on.

  A change in paradigm can be identified, as Infrastructure Managers are increasingly expected to act as system integrators. After the reform of the sector, national integrated systems were transformed into complex ecosystems with a high number of players (IMs, RUs in competition, multiple SFOs, etc.). A **systemic approach** is necessary to fully exploit efficiencies in the system, particularly when there is congestion, and only infrastructure Managers have the systemic view and the operating capability to act as coordinators.

- Notwithstanding, the empowerment of Infrastructure Managers as active managers of infrastructure needs to be accompanied by **checks and balances**. The report elaborates on three of these:

  1. **closer coordination of EU Infrastructure Managers** is necessary to reinforce the interoperability of the national networks. A more formal role for Infrastructure Manager associations might be desirable. The model of ENTSO-E, the European association of transmission system operators for electricity, offers valuable learnings for closer cooperation to reinforce the Single European Railway Area;

  2. a more active role of Infrastructure Managers is to go hand in hand with closer **oversight by Regulatory Bodies**. Being natural monopolies, Infrastructure Managers' role as system integrators needs to be closely supervised by the National Regulatory Bodies. Furthermore, as Infrastructure Managers collaborate at the EU level, a parallel evolution seems necessary for regulatory bodies at EU scale, reinforcing the role of IRG-Rail. The model of BEREC in the telecommunications regulatory framework could be followed; and

  3. for active infrastructure management to be effective in improving the overall functioning of the system, **closer collaboration with other stakeholders** in particular Railway Undertakings and Service Facility Operators is vital. Formal consultation procedures, transparency and agile conflict resolution procedures are necessary.

- Finally, the existing regulation on the financing of the industry requires a shift to **promote investment** in the development of infrastructure, both in rail infrastructure and in service facilities.

1. Access to rail infrastructure in a competitive environment

The EU regulatory framework identifies access to rail infrastructure as a key element for competition in the rail market. It is thus one of the main aims of EU regulation to ensure non-discriminatory access to railway infrastructure through the definition of the market structure (vertical separation), behavioral obligations on Infrastructure Managers (detailed capacity allocation procedures), and even a specific institutional framework to oversee the implementation of the model (Regulatory Bodies).

There are three main challenges in the current regulatory framework. Firstly, there is a need to improve coordination in the allocation of capacity for international services. Secondly, improvements will be necessary in the allocation of capacity in congested segments of the infrastructure, which in turn, is particularly relevant during the phase of opening the market to competition. Thirdly, Temporary Capacity Restrictions need to be better coordinated to minimize the impact on Railway Undertakings and Service Facility Operators.

As a response to these challenges, a trend can be identified. Infrastructure Managers are adopting a more active approach to pre-plan in advance the response to events such as congestion and Temporary Capacity Restrictions, with a systemic view. Along this line, Infrastructure Managers are also increasingly pre-arranging packages of rail tracks, to increase efficiency and meet Rail Undertaking demands, (e.g., paths for PSO services and timetables for newcomers).

1.1. A regulatory framework designed for a competitive environment

Directive 2012/34/EU establishing a single European railway area (the Recast Directive)[1] has as one of its most fundamental objectives to promote competition in the provision of rail transport services by ensuring non-discriminatory access to railway infrastructure.

The Recast Directive imposes structural measures to ensure non-discrimination. This is the case of the vertical separation between the Infrastructure Manager, who will operate infrastructure as a natural monopoly, and Railway Undertakings, who will provide transport services in competition.

Furthermore, the Recast Directive imposes behavioral obligations on Infrastructure Managers to ensure transparency and non-discrimination in access to infrastructure. Transparency is reinforced by the obligation to publish the Network Statement describing the available capacity and the rules and information to access it. The allocation procedure is strictly defined in the Recast Directive, with specific timings and safeguards for Railway Undertakings.

Finally, a national Regulatory Body has to be created by the Member States to supervise the allocation procedure and ensure access to infrastructure is enforced and takes place under non-discrimination terms.

Though certain challenges persist, particularly in the allocation of capacity for international services, the capacity allocation process in the Recast Directive has been effectively implemented by Member States in line with a set of harmonised rules as laid down in the Directive.

1.1.1. Railway infrastructure and Infrastructure Managers

[1] Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (the Recast Directive), Document 32012L0034.

The point of departure for the analysis of the existing regulation on the management of railway infrastructure is a precise definition of railway infrastructure, the entities managing the infrastructure, and the services provided over such infrastructure.

A list of railway infrastructures can be found in Annex I of the Recast Directive, which includes, as the most fundamental elements: i) the ground area; ii) track and track bed; iii) engineering structures (bridges, tunnels); iv) superstructure (rails); v) safety, signaling and telecommunications installation, and so on.

Some uncertainty has been identified in the classification of railway infrastructure. For instance, railway infrastructure in ports might be considered port infrastructure, and not infrastructure under the Recast Directive. More conflicts have arisen regarding the borderline between proper railway infrastructure and so-called service facilities (stations, freight terminals, maintenance facilities, etc.). Even if service facilities are always under the Recast Directive, they are under less stringent obligations. See Section II on Service facilities for a more detailed description of such facilities and the conflicts in delimitation.

Railway infrastructure is managed by “Infrastructure Managers”, defined as “any body or firm responsible for the operation, maintenance and renewal of railway infrastructure on a network, as well as responsible for participating in its development as determined by the Member State” (Art. 2(2) Recast Directive).

A fundamental element in the current regulation in the European Union is the vertical separation between Infrastructure Managers and Railway Undertakings, the entities in charge of the provision of transport of goods and passengers by rail. EU regulation does not impose a full vertical separation. As a matter of fact, there are different institutional models across the EU. While in some Member States there is a full vertical separation (i.e., in Spain), in other Member States the Infrastructure Manager and a Railway Undertaking are part of the same holding (Germany, France and Italy). In any case, the Infrastructure Manager must have separate accounts (and in certain cases be a legally distinct entity), and independent from any Railway Undertaking, particularly those vertically integrated in a holding, in the management of the essential functions: different information systems, different managers, etc.

Equally important in the EU regulatory framework is the principle of independence of Infrastructure Managers for their own management, administration and internal control (Art. 4(2) Recast Directive), without any interference from national governments. As the market is opened to competition, and Infrastructure Managers must meet the commercial needs of Railway Undertakings, operation without political interference becomes even more relevant. Such independence has not always been respected, as identified by the Court of Justice of the European Union (Judgment of 28 February 2013 in Case 483/10).

The relationship between Infrastructure Managers and governments is formalised through specific requirements and figures in the existing regulation. Firstly, Member States are required to publish an indicative rail infrastructure development strategy to cover at least 5 years. Based on such a strategy document, a contractual agreement is signed between the Infrastructure Manager and the competent national authority. Finally, the Infrastructure Manager will adopt a Business Plan. In these three documents the necessary investments in infrastructure will be identified, distinguishing between i) infrastructure development and ii) infrastructure maintenance and renewal.

1.1.2. Capacity allocation

The allocation of capacity by Infrastructure Managers to Railway Undertakings is heavily regulated. This is not specific to railways, and the Recast Directive builds on access regulation previously designed for other network industries. The main scope of such regulation is to ensure transparency and non-discrimination in access to the infrastructure that is necessary for the provision of rail transport services.

One of the essential functions of an Infrastructure Manager is to decide on infrastructure capacity allocation. Infrastructure capacity is defined as "the potential to schedule train paths requested for an element of infrastructure for a certain period" (Art. 3(24) Recast Directive), while a train path is defined as "the infrastructure capacity needed to run a train between two places over a given period". Infrastructure Managers are responsible for the allocation of train paths across their infrastructure.

The Recast Directive provides a very detailed procedure for the allocation of capacity to Railway Undertakings building upon a tradition of active infrastructure management in railways against other transport modes. In contrast to roads, railway Infrastructure Managers must grant capacity in advance to those entities interested in running through the infrastructure. Since only one train can use a train path at a given time, and specific train paths have to be differentiated to avoid collisions, a procedure has traditionally been put in place for the assignment of train paths for each year. Access by airlines to airport slots presents some similarities to this approach.

The Recast Directive imposes the obligation on Infrastructure Managers to publish the so-called Network Statement: "the statement which sets out in detail the general rules, deadlines, procedures and criteria for charging and capacity-allocation schemes, including such other information as is required to enable applications for infrastructure capacity" (Art. 2(26)). The Network Statement has a parallel in most regulated industries (i.e., Reference Interconnection Offers in telecommunications). It is an example of active infrastructure management, as Infrastructure Managers are not expected to passively wait for network access requests but are obliged to proactively define the available capacity so that Railway Undertakings can plan their services. Network Statements facilitate access to infrastructure under transparent, reasonable and non-discriminatory conditions.

Railway Undertakings shall file their requests for capacity no more than 8 months in advance of the change of the working timetable (second Saturday in December), so Infrastructure Managers can publish a draft working timetable at the latest four months later. Infrastructure Managers will coordinate requests, that is, they will attempt, together with applicants, to resolve situations in which there are conflicting applications for infrastructure capacity.

The Infrastructure Manager puts the draft working timetable for consultation for at least one month, so Railway Undertakings can present their views, and shall take appropriate measures to deal with any concerns that are expressed. The Infrastructure Manager shall solve potential disputes within a time limit of a few working days.

1.1.3. The role of national Regulatory Bodies

The Recast Directive attributes an important role to Regulatory Bodies to supervise capacity allocation. Again, these are institutions that build upon previous experiences in the liberalisation of network industries such as telecommunications, energy, and postal services.

The Recast Directive imposes on Member States the obligation to establish a single Regulatory Body for the railway sector. It imposes also the independence of the regulatory body from Infrastructure Managers, Railway Undertakings, and even national governments.

The main function of the Regulatory Bodies is to supervise access by Railway Undertakings to railway infrastructure. National Regulatory Bodies have the power to decide on disputes about the content of the Network Statement, as well as on refusals to allocate infrastructure capacity, or against the terms of such an allocation, including track access charges.

Member States have effectively created Regulatory Bodies. They have also formed an association, IRG-Rail, to work together. However, as can be expected, not all the Regulatory Bodies dispose of the same resources or have an equally active role in the supervision of the sector. Furthermore, decisions by Regulatory Bodies do not always converge on a common aplication of the sector-specific regulation. On the contrary, we observe that sometimes they adopt decisions that create further divergence in the application of the EU regulatory framework. National Regulatory Bodies could have a stronger role in the construction of a more coherent and harmonised regulatory framework across borders.

1.1.4. International coordination

Capacity allocation for international services is an important challenge. International services are defined as those where the train crosses at least one border. Since capacity allocation is done at a national level, an international service has to submit applications for capacity to all the Infrastructure Managers whose networks are concerned. Coordination is necessary to ensure international services.

Capacity allocation is a national process. Rail infrastructure was developed according to specifications defined at a national scale, and it owned and operated by entities that work at national or subnational scale. Capacity allocation procedures by each Infrastructure Manager are under the supervision of the relevant national Regulatory Body.

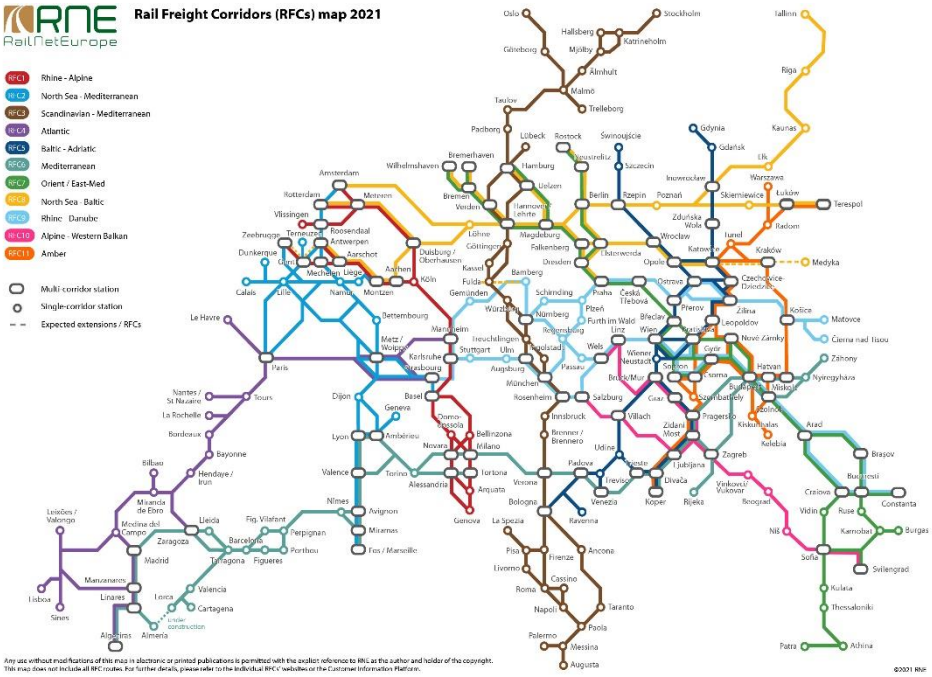
The Recast Directive imposes coordination instruments. Among these was the creation of the European Network of Infrastructure Managers (Art. 7F). Network Statements must state the principles governing international coordination (Art. 46). The special needs of international services have to be taken into account in the coordination process (Art. 46(4)). Member States are invited to take into consideration international services in the definition of priority criteria (Art. 47). Cooperation between Regulatory Bodies is foreseen (Art. 57).

The Recast Directive provides an example of active infrastructure management when it imposes the obligation to organise train paths crossing more than one network (Art. 40). It is understood that passively waiting for application cannot ensure functional paths across networks.

Further cooperation instruments have been developed, particularly for international freight services in the form of Rail Freight Corridors (RFC), governed by Regulation (EU) No 913/2010.[2] Specific international routes have been defined so Infrastructure Managers along them can more closely cooperate, always on a voluntary basis, to facilitate international services.

[2] Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight, Document 32010R0913.

Figure 1. Rail Freight Corridors



There is wide consensus that the promotion of international services, both freight and passenger services, requires a closer collaboration between Infrastructure Managers. Experience in other network industries paves the way for a closer collaboration both by Infrastructure Managers (ENTSO-E in electricity has been proposed as a model) and national Regulatory Bodies (BEREC in telecoms has been proposed as an interesting model).

1.2. But congestion is a barrier to entry

The existing regulatory framework does not provide an effective response to one of the main barriers to entry into the rail market, that is the congestion in infrastructure. Even if the Recast Directive has imposed common minimum structural measures in the form of vertical separation, a common procedure for capacity allocation, and the same institutional framework across the EU, it does not effectively regulate congestion so as to reduce barriers to entry.

The Recast Directive takes a rather procedural approach to the management of congestion. It defines what congestion is (rather vaguely), and it defines the legal consequences of the declaration of an infrastructure as congested: adoption of a capacity analysis, adoption of a capacity enhancement plan, capacity charges, etc. Member States have mostly bypassed the implementation of these measures.

Even worse, no agreement could be reached for the adoption in the Recast Directive of common priority criteria for the allocation of capacity in case of congestion. Such criteria are defined at a national level, contrary to the case of congestion in airports, which is ruled in EU Regulation 95/93.[3]

Even at a national level, priority criteria have not defined rules to strike a balance between capacity allocated to incumbents and to newcomers. Access to a bundle of track access rights, ensuring a fair amount of services properly distributed in intervals along the day is not possible in the most attractive routes, as they are already congested or close to congestion with services provided by the incumbent. This is one of the most relevant barriers to entry for newcomers.

[3] Council Regulation (EEC) No 95/93 of 18 January 1993 on common rules for the allocation of slots at Community airports, Document 31993R0095.

1.2.1. Congestion management in the Recast Directive

The Recast Directive provides a framework for the management of congested rail infrastructure. However, experience shows that this framework has not been effectively implemented around the EU.

The Recast Directive defines congested infrastructure as “an element of infrastructure for which demand for infrastructure capacity cannot be fully satisfied during certain periods even after coordination of the different requests for capacity” (art. 3(20)). Most Member States have simply transposed this definition with its exact wording in their national legislation.

Infrastructure Managers have the obligation to meet all requests for infrastructure capacity (Art. 46(1) Recast Directive). When they receive conflicting requests for capacity, they have to coordinate them. This can be done through consultations with the interested parties, or by proposing infrastructure capacity that differs from the one which was requested. When coordination falls short of meeting the existing requests, infrastructure is congested.

The Recast Directive defines a specific procedure to manage congestion. Infrastructure Managers must draw up an immediate formal declaration of congestion when it proves impossible to satisfy requests for infrastructure capacity (Art. 47(1)). Such a declaration triggers the obligation to carry out a capacity analysis to determine the constraints on infrastructure capacity which prevent requests for capacity from being adequately met, and to propose methods for enabling additional requests to be satisfied. The capacity analysis shall identify the reasons for the congestion and the measures, which may be taken in the short and medium term to ease the congestion (Art. 50). Within six months of the completion of the capacity analysis, the Infrastructure Manager shall produce a capacity enhancement plan: On the basis of a cost-benefit analysis of the possible measures identified, it shall determine the action to be taken to enhance infrastructure capacity, including a timetable for implementing the measures (Art. 51).

However, there is a wide divergence on congestion declaration across the EU, resulting from the fact that several important aspects are not harmonised in the Recast Directive. This, in turn, has been confirmed by IRG-Rail in the 2019 report “A survey of congested infrastructure, priority criteria and capacity charges in Europe”, which identifies that:

1. There are no common rules for the geographical delimitation of infrastructure segments to be analysed to identify congestion. It might be a very specific segments, or it might be a whole line.
2. There is no common procedure for the declaration of congestion.
3. There is no precise definition of when demand exceeds capacity. Across the Member States different authorities define the criteria: it might be in legislation, it might be the Regulatory Body, of the Infrastructure Manager. And the criteria are also different.
4. Congestion in a very specific point in time might trigger the declaration of congestion in some Member States but not in others, and the declaration might be just for specific dates or for the whole timetable.
5. The treatment of Temporary Capacity Restrictions is very different. In some Member States they are not taken into consideration, while in others they are the main reason for congestion declaration.

However, it seems to be a common trend across most Member States to avoid the declaration of congestion altogether. Half of the Member States have never declared a railway infrastructure as congested. In those Member States which have made the declaration, the number of congested segments is surprisingly low:

Figure 2. Number of congested segments per Member State

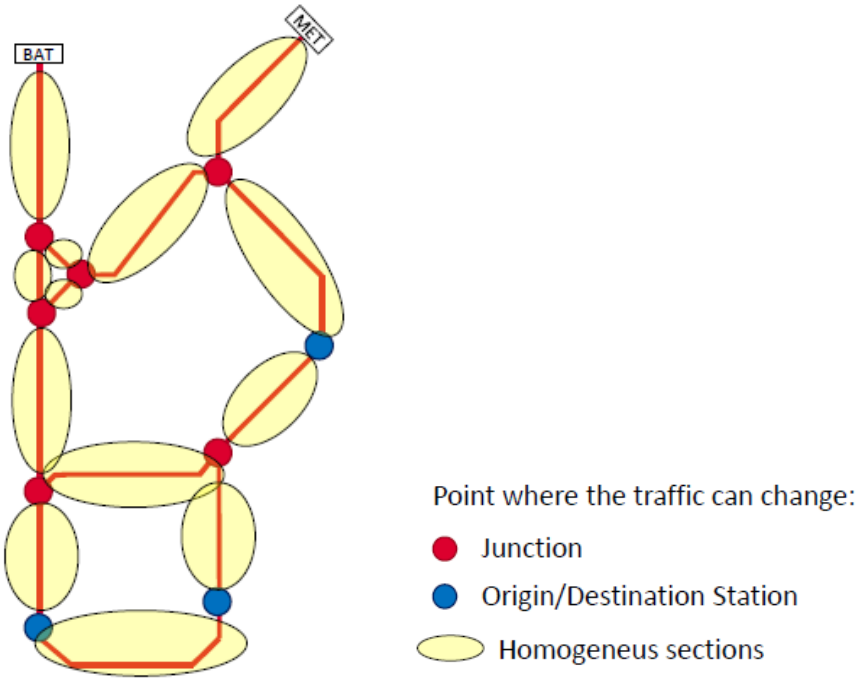
	2014	2015	2016	2017	2018	2019
France	0	0	0	0	0	0
Germany	1	1	1	1	1	0
Italy	0	0	0	0	0	314
Spain	0	0	0	0	0	3
Sweden	5	6	4	6	19	12

Source: IRG-Rail (2019): A survey of congested infrastructure, priority criteria and capacity charges in Europe, 15 November 2019, pp. 5-6.

In most Member States congestion declaration is bypassed by defining very strict criteria for the declaration of congestion, or on the contrary, by defining very generous criteria in the coordination procedure for the alternative to be proposed by the Infrastructure Manager. Since the number of congested segments is very low across the EU, the instruments in the Recast Directive to manage congestion have had a very limited application in practice. This, however, does not mean that congestion does not exist, or that it is not a serious barrier to entry. Instead, it means that the existing instruments have been neutralised.

Italy provides a best practice in terms of congestion declaration after the implementation of Resolution ART 118/2018 adopted by the national Regulatory Body. Firstly, segments are defined very granularly, including sections between junctions and stations, as opposed to full lines.

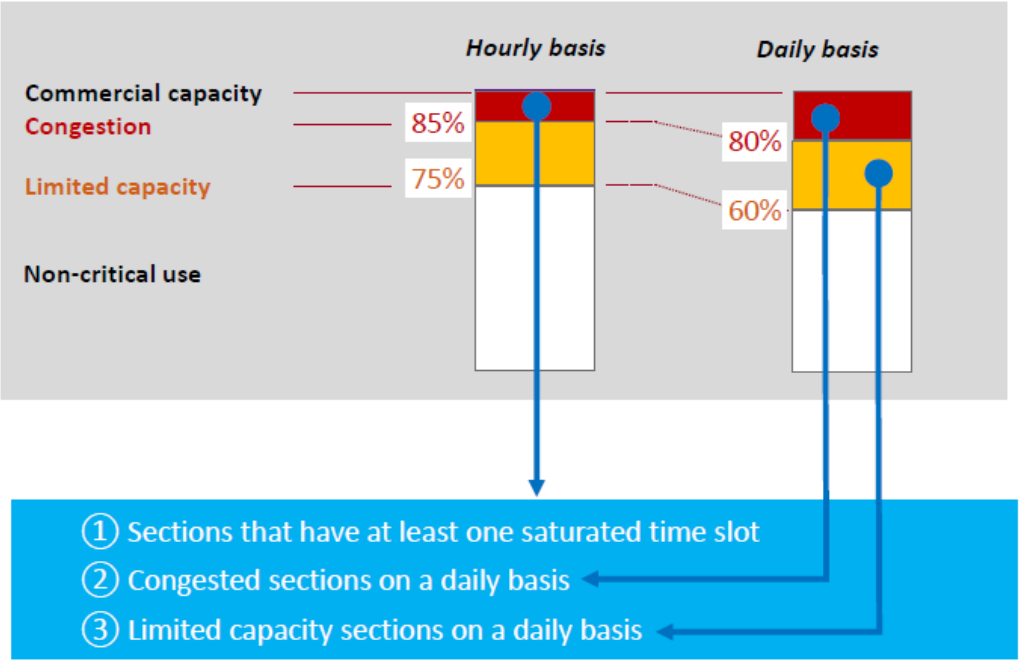
Figure 3. Segment definition



Source: Image produced by RFI for the UIC Working Group.

The distinctive element is that other than congested segments, a new category has been created, that of “limited capacity”, which is not congested yet, but might evolve into congestion. This is why the number of congested segment is so high in Italy when compared with the rest of the European Union. The total number of segments in the network is around 1,700. Starting in 2019, and as a result of the adoption of new rules by the Regulatory Body, the number of segments declared as congested went up from 0 to 314, most of them declared as “limited capacity” rather than “congested”:

Figure 4. Declaration of congestion



Source: Image produced by RFI for the UIC Working Group.

The underlying objective was to advance the line of intervention, and to ensure a reaction in terms of capacity enhancement plan before the segments become overly congested. The rules in Italy can be understood as an example of active capacity management. The Infrastructure Manager does not wait for the infrastructure to be saturated to trigger the reaction in terms of 1) allocation of capacity in such segments; and 2) work for the better use of the capacity or increase the capacity to ease congestion in the segment. The Infrastructure Management proactively analyzes the situation of the infrastructure and reacts before the infrastructure becomes congested.

1.2.2. Priority rules

When a network segment is declared as congested, the Infrastructure Manager can apply priority criteria to allocate infrastructure capacity.

The Recast Directive allows Infrastructure Managers to charge congestion charges, that is, surcharges that provide incentives for a more rational use of the congested infrastructure (Art. 31(4)). Pricing is probably the most objective instrument to manage congestion in an infrastructure, as well as to harmonise the management of congestion across the EU. However, the Recast Directive does not indicate how define the amount of the congestion charge (cost driver or market driver), or how to use any extra revenues.

Congestion charges have been very rarely implemented in railways, whereas their impact has been limited in the few instances they have been implemented (IRG-Rail 2019). Congestion charges act to increase the cost of the service, which constitutes a problem in important market segments such as freight. Congestion charges, furthermore, would prioritise commercial services over PSO services, reducing the quality of services in suburban and regional segments. For these reasons, congestion charges are generally not popular in railways.

Priority criteria, instead, are the preferred means to allocate capacity across the EU in cases where not all requests can be met. The Recast Directive refers to certain criteria, or more precisely, to the results of the application of such criteria. In terms of obligations, the priority criteria “shall take account of the importance of a service to society relative to any other service which will consequently be excluded”, and more broadly “The importance of freight services, and in particular international freight services, shall be given adequate consideration in determining priority criteria” (Art. 47).

However, the Recast Directive does not define common priority criteria for the EU. On the contrary, the definition of such criteria is left to the discretion of Member States. As a result, this very fundamental instrument in the management of infrastructure, particularly in a competitive environment, has become a tool for the fragmentation of the market, instead of a tool for the construction of the Single European Railway Area.

In most Member States priority criteria are defined in terms of specific types of train services. In most cases priority is given to services under public service obligations, as well as to international services. However, secondary criteria are often necessary, as such criteria do not solve conflicts between the same type of services. Secondary criteria are more divergent. In some Member States, the higher the track access charge to be paid by the service, the higher the priority. In other Member States, priority is given to applicants with the highest utilisation rate in the past.

The Italian experience is particularly interesting, as priority rules do not result in absolute preferences for one service over another, but the preferred typology of service has only the right to use 60 percent of the available capacity in a given time bracket:

1. In the allocation of train paths relating to requests for a timetable period and/or for intermediate adjustment, the IM, without prejudice to the paths requested in accordance with an executed Framework Agreement, shall assign priority to: 1) international train services; 2) transport services the quality and quantity of which is sufficient to meet the mobility needs of the general public, governed by specific service agreements to be entered into between RU and the central or regional governments; and 3) high-speed train services (entirely or partially) using dedicated infrastructures – built anew or upgraded – and to freight transport services carried out on dedicated lines, without prejudice to the provisions under Articles 101, 102 and 106 of the TUEF.

2. Any incompatibility between train paths with equal priority, in accordance with the previous paragraph 1, shall be solved by giving priority to the service aimed at the traffic characteristic of the time slot of interest, as follows: 1) the transport services qualitatively and quantitatively sufficient to meet the mobility needs of the general public, governed by specific service agreements to be entered into between RU and the central or regional governments shall be assigned priority status, with respect to the other services referred to in paragraph 1, in the commuter time slots, i.e., between 6.00-9.00 and 17.00-20.00; 2) the high-speed train services (entirely or partially) using dedicated infrastructures – built anew or upgraded, and the international passenger services – shall be given priority status along the entire route vis-à-vis the other services referred to in paragraph 1 between 7.00-22.00, excepting the time slots referred to in the preceding sub-paragraph; and 3) international freight services or freight services provided on dedicated lines shall be given priority status along the entire route, with respect to the other services referred to in paragraph 1 in the time slot between 22.00 and 6.00.

3. In the case of incompatibilities that cannot be solved based on the rules set out above, the capacity shall be allocated prioritarily to the services in the order as follows: 1) services carrying national freight on non-dedicated lines in the time slot between 22.00 and 6.00. The priority refers to the paths related to the requests made by the RUs that have entered into commercial agreements for transporting dangerous goods and for combined/integrated transport; 2) services provided under interval-service timetables, even if provided by more than one RU under specific commercial agreements, documented to the IM on the submission of the path request and, in any case, concluded in accordance with the principles set out in Article 81 of the Treaty and of the applicable national legislation; 3) services that most utilise weekly uniform paths; 4) services using paths that segment to a lesser extent the line, individually developing the most number of kilometres; and 5) if it should still prove impossible to solve the conflict, according to the priority represented by the order of presentation of the requests.

4. In the apportionment of the capacity for requests during the applicable working timetable period the priority is always determined by the order of presentation of the requests.

5. However, the priority service, in the presence of other requests, cannot lead to the congestion of the infrastructure capacity, since priority is not an exclusive right. The maximum share of the available capacity that can be allocated - for each Section and time slot - to each type of priority service (Regional Passengers, Medium/Long-Distance Passengers, Freight) is fixed at 60%. This maximum percentage does not apply to dedicated or specialised lines for certain types of traffic. This principle is applied also in the capacity allocation formalised with the framework agreement.

6. Any incompatibilities between path requests submitted by different Railway Undertakings for the same type of service shall be governed with the priority criteria referred to in sub-paragraphs 1, 3 and 4 above. As regards the Section of interest, the RU granted priority status cannot be allocated all the available paths in the day for the requested type of service, because priority is not an exclusive right: the maximum share of available paths that can be allocated to the RU granted priority status is fixed at 80 percent. This principle shall be applied also to the capacity allocation formalised under a framework agreement.

7. The priority criteria hereunder exclusively concern the allocation of the integrated capacity of the lines, facilities and terminals owned by the IM. Priority criteria for traffic management purposes are set out in the applicable operating regulations.

A second approach is to set the priority criteria based on the properties of the train paths requested. The French model is particularly interesting, as it is an example of active infrastructure management. There is a difference between prepared and unprepared paths. Prepared paths are prebuilt at regular intervals and priority for the use of such paths is given to PSO traffic. Freight services, on the contrary, have priority for the use of unprepared paths. Another particularly interesting aspect of the French case is that such priority rules are executed during the scheduling period for the coordination of requests and not after the declaration of congestion.

A third approach is to define the priority criteria based on a social cost-benefit model. Sweden leads this approach: The model estimates the cost of excluding or adjusting a service, and based on the most efficient solution, paths are assigned.

The result is a patchwork of complex rules defined at a national level, which tends to privilege services under PSO contracts.

1.2.3. Congestion as a barrier to entry

Even if the track allocation procedure was defined in the Recast Directive to facilitate competition, it does not solve one of the most fundamental challenges to be faced by Infrastructure Managers across network industries when they are open to competition: the balance in the use of infrastructure between the incumbent and the newcomers in case of congestion.

The Recast Directive, as it has been described, does not define harmonised priority criteria in case of congestion, so it does not set specific criteria for the distribution of capacity between the incumbent and newcomers. In fact, it makes no reference at all to such criteria, other than statements on the need to protect PSO, freight and international services when defining priority rules.

National priority rules do not define criteria to determine the right balance between capacity assigned for the incumbent and the newcomers. There are no rules granting priority for the use of infrastructure to the incumbent, nor rules prioritising the assignment of capacity to newcomers to spur competition.

This is in contrast with the regulation in the aviation sector, where priority rules are defined at the EU level in EU Regulation 95/93 (Art. 8). The Regulation grants the right to use specific airport slots to those air carriers that have used them in the previous scheduling period. In this way, priority is given to incumbents, what is known as “grandfather rights”. Such a rule is modulated by the obligation to use the slots at least 80 percent of the time to avoid surrendering them back to the slot pool for allocations. Newcomers (regional airlines, lo-cost carriers) often complain of such a barrier to entry.

In the railway sector, there are no grandfather rights, but the lack of clear rules seems to be a barrier to entry to the market for newcomers, particularly for commercial passenger services. Newcomers aiming to compete head-to--head with the incumbent require not only a large number of track rights to connect large cities, but also to organise them according to certain intervals to meet demand at peak times while reducing waiting times by providing services gradually along the day. This type of track capacity is often not available in the most popular lines. There might be some capacity available, particularly at off-peak times, but it will be rare to have capacity at peak times. Even more, it will be rare to have capacity at the right interval, making it possible to have tracks available just at the right time to meet the demand of a full daily plan for a train to spend the minimum time in each station before starting the return service.

Market entry in passenger commercial services has been very slow across the EU so dar, even if it seems it is accelerating. A number of limited entry examples can be identified in countries such as Germany, and more broadly in Sweden and Austria, but are limited to one or two lines. Competition is broader in the Czechia.

Only in Italy there is a newcomer competing head-to-head with the incumbent in a high number of lines (basically the entire high-speed network). Market entry was facilitated by the fact that the newcomer entered the market as the new high-speed infrastructure was completed, the incumbent had not exhausted the capacity with its own services and the Infrastructure Manager made put the capacity at the disposal of the newcomer.

Full market entry with a high number of services at the right interval is not possible at the moment in the most popular lines in the EU for a newcomer with the available capacity, unless the incumbent stops using some of the capacity. A common set for priority criteria for the whole EU might not be necessary, but more clear guidance at the EU and national level for the balance between incumbents and newcomers would facilitate decision making.

1.3. Active infrastructure management

Limitations have been identified in the passive management of track capacity in a competitive environment. Infrastructure Managers have difficulties to coordinate conflicting applications as newcomers increase their activity. In congested infrastructure, passively waiting for requests might not result in the optimum use of the existing capacity, as applications are not coordinated, or maximize the travelers’ needs by focusing only on the most attractive routes/stations and time slots (cherry picking). Furthermore, available capacity might not be properly organised in a minimum number of paths along the day with the right intervals, resulting in the impossibility to run an operation in the position to compete with the incumbent. Finally, allocation is usually made on an annual basis, in such a way that no certainty is given to Railway Undertakings to make long-term investment in rolling stock, etc.

Some active infrastructure management practices can be identified that allow for better planning of the existing capacity, long term allocation of capacity through Framework Agreements and even tendering of the available capacity.

1.3.1. Active organisation of train paths

One way to improve the effective capacity in the rail infrastructure is to actively plan the available tracks according to a predefined schedule taking into account the needs of the Railway Undertakings.

At the moment, Infrastructure Managers mostly wait passively for applicants to file their requests for track capacity for the following year. As applicants have little visibility about the requests filed by other applicants (other than the schedule for the previous year) conflicts grow as newcomers enter the market, forcing Infrastructure Managers to coordinate, sometimes in a rather proactive way allocating alternative track capacity to satisfy a request.

Newcomers seeking to compete head-to-head with the incumbent in popular routes will face difficulties to secure a sufficient number of tracks, and in particular, tracks with the right intervals to connect services to be provided with the same train.

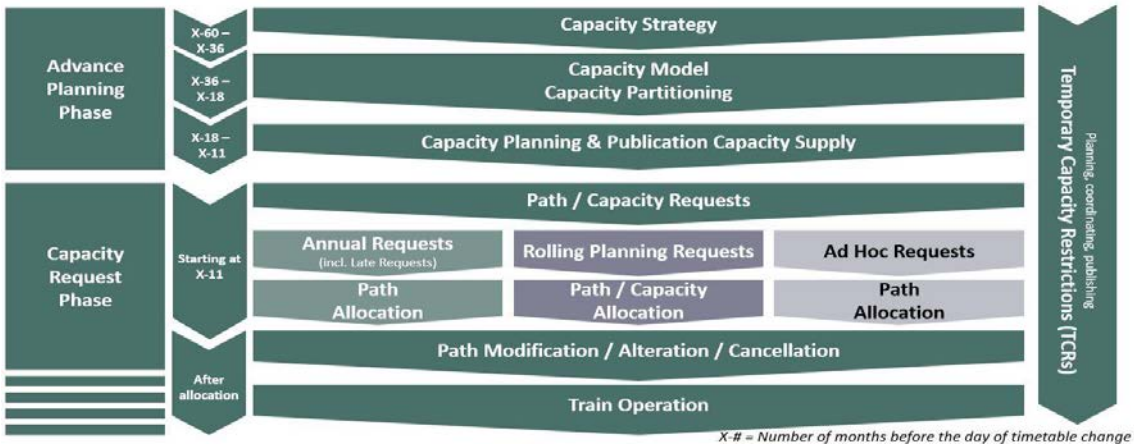
When railways were reformed in the UK in the early 1990s, it was identified that inviting train companies to post bids for train paths would produce considerable overlap of preferred departure times. The conflicts could be resolved, but the processes would be complex, time-consuming and would not necessarily produce an optimum outcome. Academics proposed to plan the optimum use of the existing infrastructure according to the timetable that would guarantee stability in terms of number of services and specific train schedules. In order to introduce competition, packages of services according to the optimum timetable can be defined and then allocated to specific Railway Undertakings[4].

A first precedent of this approach in the current activity to build a timetable for cross-border services. International train paths have to be organized, or “pre-arranged” according to the language in Article 40 of the Recast Directive.

The key characteristic of the redesigned timetabling process lies in the consolidation of all known capacity elements (available capacity, expected traffic volume, etc.) into a single entity: the capacity model. In this model – all data regarding a specific timetable period will be incorporated. Findings from the capacity strategy will be included and applicants will be asked to provide capacity announcements. The capacity model is created starting three years before the timetable change under the lead of the IMs for each international line individually to reflect the local needs and particularities. It assigns the capacity to the various commercial and technical needs (‘capacity partitioning’).

Using this method, it is possible for Infrastructure Managers to coordinate their efforts well in advance, share and discuss information on capacity bottlenecks with applicants long before the start of capacity requests and accelerate the creation of timetables after the request phase. This approach will help to reduce load peaks for all involved stakeholders and increase the efficiency of the entire process.

Figure 5. Timetabling and Capacity Redesign Process (TTR) process



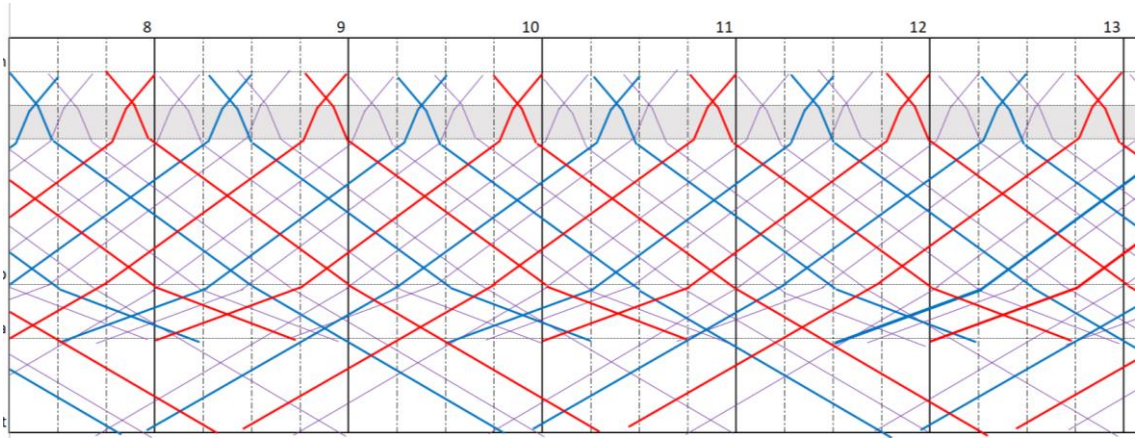
Source: RailNetEurope https://ttr.rne.eu/process/process-components/

[4] David Starkie (1993), “Train Service Co-ordination in a Competitive Market”, *Fiscal Studies, The Journal of Applied Public Economics*, https://doi.org/10.1111/j.1475-5890.1993.tb00479.x.

In France there are prepared paths, i.e., packages of paths that are prebuilt at regular intervals. Priority for the use of such paths is given to PSO traffic. In this way, PSO services benefit not only from a minimum number of paths, but even more relevant, from the right intervals in between them to ensure the right service. At the same time, tracks are left for commercial uses, ensuring the necessary capacity for such services.

The Spanish Infrastructure Manager, ADIF AV, built on these proposals and experiences to create an optimised coordinated timetable with tracks available for the provision of high-speed services in the most popular corridors. ADIF AV determined the optimum departure stations (servicesfrom Madrid to Valencia and Alicante will mostly use Chamartin station and not Atocha station as in the past), the indicative departure time for each service, the speed, the time of arrival at the destination, the waiting time in the destination, the departure time for the return trip and the optimum time to arrive back in Madrid and be ready for a new departure. In this way, the scarce capacity in Madrid stations (and also in Barcelona) will be used efficiently by Railway Undertakings, which must adapt to an optimised timetable with the right intervals for departure times throughout the day.

Figure 6: Modeling an optimised timetable



Source: Image produced by ADIF AV for the UIC Working Group.

Such a timetable allowed three Railway Undertakings to coexist and compete. The three packages of track capacity were built closely following the business models of the Railway Undertakings, identified after a consultation with the incumbent and potential newcomers: One package allowed services at a similar scale and with a similar timetable as operated by the incumbent. Without formally recognising grandfather rights, it was made possible for the incumbent to continue operations. Two further packages were built, one for head-to-head competition with the incumbent, and a smaller package with a limited number of daily services for a low-cost business model.

According to ADIF AV, such an active management of the existing infrastructure has allowed to increase the number of services in the existing infrastructure by 55 percent. A more active coordination, furthermore, has allowed to optimise the use of congested infrastructure, in particular the three largest stations in the country, which are the bottleneck in the national network.

1.3.2. Framework Agreements

The existing regulatory framework provides the concept of “Framework Agreements” firstly to enable long-term contracts for the allocation of capacity, and furthermore, to formalise the creation of coordinated packages of rail paths, as implemented by ADIF AV.

Framework Agreements are defined in the Recast Directive as “a legally binding general agreement […] setting out the rights and obligations of an applicant and the Infrastructure Manager in relation to the infrastructure capacity to be allocated and the charges to be levied over a period longer than one working timetable” (Art. 3(23)). Commission Implementing Regulation 2016/545 is specifically devoted to Framework Agreements[5].

Framework Agreements enable Railway Undertakings to plan their activities beyond a mere annual assignment of rail path capacity. They were created to grant Railway Undertakings the necessary certainty for long-term investment in rolling stock and all the necessary assets, which have long maturity terms, certainly beyond one year. Framework Agreements do not effectively grant access to rail infrastructure capacity. They do not even define train paths in detail. Specific train paths are still allocated on an annual basis by the Infrastructure Manager. However, preference is given to undertakings completing Framework Agreements.

Framework Agreements could preclude the use of infrastructure by other applicants. For this reason, they are limited by EU legislation in duration (five years with some derogations) and scope (no more than 70 percent of total available capacity). These agreements can be precluded in congested infrastructure.

Besides providing long-term stability, Framework Agreements have been used by ADIF AV as the instrument to formalise the track capacity packages and as the object of the assignment to Railway Undertakings.

1.3.3. Experience in Spain

The Spanish Infrastructure Manager has experimented with an innovative system to allocate capacity through a call for synchronous requests to conclude framework agreements. ADIF AV invited Railway Undertakings that were potentially interested in the Framework Agreements defined based on the optimisation of the available capacity to submit their requests for Framework Agreements before 31 October 2019. Railway Undertakings could define their capacity needs according to their business plans. It was not compulsory to adapt the request to the optimised capacity structure defined by ADIF.

Only if the capacity requests by all Railway Undertakings exceeded the available capacity would specific priority criteria be applied. In this case, Railway Undertakings would not be able to submit a new request, but the original capacity requests already submitted would be evaluated according to the priority criteria defined by ADIF AV. Six undertakings submitted capacity requests.

ADIF AV defined the most intensive use of infrastructure capacity as the parameter to prioritise the conflicting requests to conclude Framework Agreements. Agreements would be concluded with the candidates requesting the highest number of train paths included in each Framework Agreement in a sealed-bid auction. Only one package would be granted to a single Railway Undertaking, excluding capacity. In the case of a tie, further parameters were defined: (i) commitments to reduce CO_2 emissions; (ii) a lower percentage of employees with short-term labor contracts; (iii) a higher percentage of women employed; and (iv) a higher percentage of disabled employees.

[5] Warnecke, C. (2014). Rahmenverträge für Fahrwegkapazität: zwischen Investitionsanreizen und Markteintrittsbarrieren, available at http://geb.uni-giessen.de/geb/volltexte/2014/10593/pdf/WarneckeChristiane_Aufsatz_Rahmenvertraege_2013_12_18.pdf.

ADIF made the results public on 27 November 2019. As expected, Renfe was assigned Package A; that is, the package with 60 percent of the capacity in the three leading high-speed corridors. In fact, Renfe did not bid for all the available capacity, but only for 86 percent of it. This means it will operate 112 return services a day in all three corridors (10 percent more than before the tender). ILSA-Trenitalia was assigned Package B. ILSA is a corporation controlled by Spanish regional airline Air Nostrum, with a 45 percent stake owned by Trenitalia, the Italian railway incumbent. ILSA committed to make use of 70 percent of the available capacity in Package B (43 return services a day). SNCF, the French railway incumbent, was assigned Package C. SNCF committed to fully operate all the available capacity (15 return services a day), starting in May 2021.

Overall, the three competitors committed to exploit on average 55 percent more services than those Renfe was providing before liberalisation. The newcomers will exploit around 35 percent of the capacity assigned in Framework Agreements. In financial terms, ADIF has estimated a €2 billion increase in revenue over a 10-year period. The signature of the Framework Agreements took place in May 2020, with some delay due to the COVID-19 crisis.

1.4. Temporary capacity restrictions

The allocation of track capacity is too often affected by so-called Temporary Capacity Restrictions (TCRs), a term encompassing different types of construction works and events which lead to a reduction of railway infrastructure capacity.

It is widely understood that Temporary Capacity Restrictions are necessary to keep infrastructure in good condition and to allow infrastructure development, but TCRs can have a very detrimental effect on traffic, and even on the competitiveness of rail against other transport modes, if they are not properly managed. Railway Undertakings have historically expressed discontent with the management of TCRs, and as a result, a series of initiatives are underway to improve the situation.

The solution entails requiring Infrastructure Managers to adopt a more systemic and active approach. In other words, they are required not only to improve the procedures to publish the TCR in their networks and to coordinate the remaining capacity, but to internationally coordinate with other Infrastructure Managers. Even more importantly, Infrastructure Managers have to take into consideration the effects across the system and in particular the impact of TCRs on Railway Undertakings and even Service Facility Operators, also in financial terms. Once more, an active management of the infrastructure is required, in such a way that Infrastructure Managers act as coordinators of the fragmented railway system.

1.4.1. Better procedures to minimise distortions

There is a widely coordinated effort to improve the procedures to manage TCRs. The main scope is to provide early information of upcoming restrictions, with a view to minimise disruption of Railway Undertakings' operations or at least enable them to better adapt to the unavoidable disruptions.

The European Commission adopted Commission Delegated Decision (EU) 2017/2075[6] replacing Annex VII in the recast Directive. The Decision has produced a classification of TCRs according to the impact on operations: Duration of the restrictions measured in consecutive days, and Impact on traffic measured in traffic cancelled, re-routed or replaced.

[6] Commission Delegated Decision (EU) 2017/2075, of 4 September 2017, replacing Annex VII to Directive 2012/34/EU of the European Parliament and of the Council establishing a single European railway area, DOEU L 295/69, of 14.11.2017

A further effort has been undertaken by RailNetEurope, the association of European Infrastructure Managers, to harmonise the application of the regulation on TCRs, by publishing Guidelines for Coordination/Publication of Temporary Capacity Restrictions. As part of this exercise, on the one hand, the types of restrictions have been systematised, as they were not evident based on the text of the Decision (IRG-rail confirmed that there are loopholes and difficulties in the interpretation of the Decision[7]). On the other hand, criteria were proposed for the harmonised interpretation of the parameters: how to calculate consecutive days, and impact on traffic (which is particularly difficult to calculate):

Figure 7. Types of Temporary Capacity Restrictions according to Annex VII

	Consecutive days	Impact on traffic (estimated traffic cancelled, re-routed or replaced by other modes of transport)
Major impact TCR[1]	More than 30 consecutive days	More than 50% of the estimated traffic volume on a railway line per day
High impact TCR[1]	More than 7 consecutive days	More than 30% of the estimated traffic volume on a railway line per day
Medium impact TCR[1]	7 consecutive days or less	More than 50% of the estimated traffic volume on a railway line per day
Minor impact TCR[2]	undefined	More than 10% of the estimated traffic volume on a railway line per day

Source: Guidelines produced by RailNetEurope, version 3.00, 4.12.2019, p. 10.

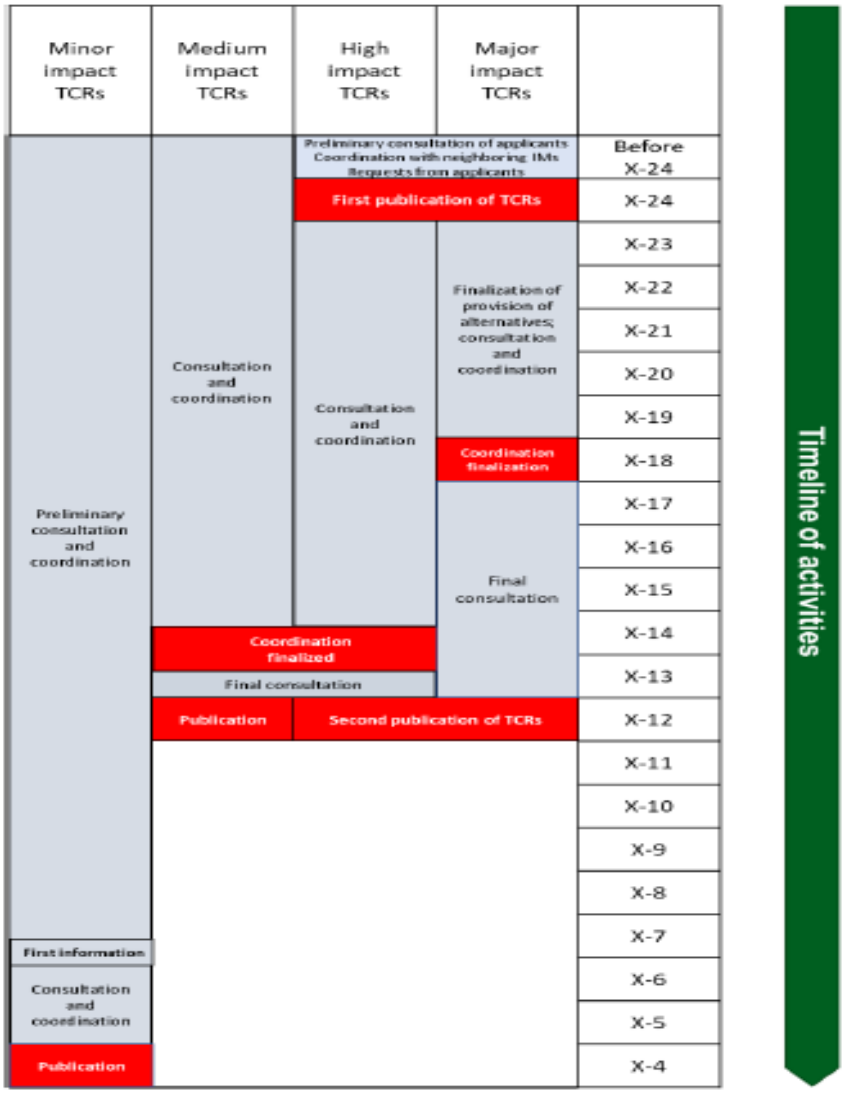
Furthermore, the Commission Delegated Decision adopted a demanding schedule for the publication of the TCRs, particularly those with a more substantial impact on operations: the most disruptive TCRs in RalNetEurope classification. The Decision imposes the obligation to publish such restrictions for the first time at least 24 months before the change of working timetable. The scope is to complete a first coordination in time for the submission of path requests by applicants, 12 months before the change of working timetable. Requests would already take into consideration TCRs, and in this way, TCRs would not disrupt allocated paths.

Such a long period, 24 months, was introduced in order to empower Railway Undertakings and even Service Facility Operators, to actively participate in the coordination of available capacity in case of TCR. After the first publication, an in-depth consultation is undertaken (see next section). Based on this consultation, the Infrastructure Manager coordinates TCRs according to the existing needs identified by applicants, resulting in a second publication and the subsequent consultation with Railway Undertakings, to ensure a proper coordination. See Figure 8 for the timeline defined in the Commission Delegated Decision (EU) 2017/2075.

It has been pointed that sometimes the EU requirements for the execution of a project with EU funding pose a challenge for meeting the obligation for public information of TCRs 24 months in advance. It is the case of the Recovery Funds, which have to be started and terminated in a short period of time, sometimes not allowing the 24-month lapse for publication.

[7] IRG-rail (2021): Overview of the implementation of current rules relating to Temporary Capacity Restrictions m(TCRs) under Delegated Decision (EU) 2017/2075, November 2021.

Figure 8. Timeline to publish and coordinate TCRs



Source: Guidelines produced by RailNetEurope, version 3.00, 4.12.2019, p. 15.

International coordination of TCRs is of particular importance to reduce the impact on increasingly relevant cross-border operations. TCRs were already part of the coordinating role of Rail Freight Corridors, but further coordination was considered necessary. The Infrastructure Managers responsible for the TCR shall share all known information about the planned TCR (i.e., period, duration, section of the line affected, possible impact on capacity and plans about cancelling, rerouting train paths or replacement by other modes) with Infrastructure Managers, applicants and the main operators of service facilities that might be impacted by the TCR. It has been pointed by IRG-rail that the schedule for the international exchange of information is not fully compatible with the regular schedule for national publication, consultation and coordination, introducing an element of further complexity in the system.[8]

IT solutions are being developed for the exchange of TCR information among Infrastructure Managers, and Railway Undertakings and Service Facilities Operators. Infrastructure Managers have to publish TCRs in their Network Statement, but in the framework of RailNetEurope, a tool to concentrate the information of all participating Infrastructure Managers has been developed.

[8] IRG-rail (2021): Overview of the implementation of current rules relating to Temporary Capacity Restrictions m(TCRs) under Delegated Decision (EU) 2017/2075, November 2021.

Despite the efforts, Railway Undertakings are not fully satisfied.[9] Even if improvement is recognised, not all Infrastructure Managers have implemented Annex VII, and when they have implemented it, this has not been done in a harmonised manner. IRG-rail confirms that "there may still be further work to do to reach full compliance with the Delegated Decision".[10] For this reason, a Task Force was instituted involving RailNet Europe, but also Railway Undertakings in the form of their associations: Forum Train Europe and European Rail Freight Association.

1.4.2. Principles ruling coordination

A more systemic approach in the management of TCRs is required. According to the Commission, "Infrastructure Managers should not only take into account their own costs when choosing between different alternatives of capacity restrictions, but also the commercial and operational constraints of the applicants concerned and the risks of transport being shifted to less environmentally friendly modes of transport." (Commission Delegated Decision (EU) 2017/2075).

For the most disruptive TCRs, Infrastructure Managers are obliged to provide "a comparison of the conditions to be encountered under at least two alternatives of capacity restrictions". The Infrastructure Manager shall design those alternatives on the basis of input provided by the applicants at the time of their request and jointly with them" and shall include the following information for Railway Undertakings to adopt informed decisions: 1) the duration of the capacity restriction; 2) the expected indicative infrastructure charges due; 3) the capacity available on diversionary lines; 4) the available alternative routes; and 5) the indicative travel times (paragraph 16 Commission Delegated Decision (EU) 2017/2075).

Infrastructure Managers are also obliged, for the most disruptive TCRs, to "establish criteria for which trains of each type of service should be re-routed, taking into account the applicant's commercial and operational constraints", and "publish in the Network Statement those criteria" (paragraph 17 Commission Delegated Decision (EU) 2017/2075). Most Infrastructure Managers have not published specific criteria, or they have merely referred to regular capacity allocation priority criteria. There are some particularly interesting experiences in Germany, France and Sweden.

In the French case, for instance, detailed criteria have been defined by SNCF Reseau: 1) the pro rata of the types of traffic observed during the previous timetable; 2) forecasts of changes in known traffic; 3) commercial and operational constraints of traffic; and 4) Infrastructure Manager's cost reduction objective.[11]

In Sweden, on the other hand, the most sophisticated criteria in terms of a systemic approach have been defined for prioritising the preliminary allocation of capacity: 1) supply (quantity of traffic with different train types, to ensure that all types of traffic can be maintained); 2) difficulties to replace railway transport with other modes of transport; and 3) time sensitivity for different types of traffic.[12]

In any case, no specific obligations have been imposed on Infrastructure Managers regarding the methodology to proactively adopt a systemic approach. There are no clear rules on how Infrastructure Managers should take into consideration not only their costs, but beyond their own interests, identify the optimum solutions for the whole system when coordinating TCRs: costs passed onto Railway Undertakings and Service Facility Operators, ways to minimise such costs, etc.

[9] Forum Train Europe (2022): How to optimize TCR processes to strengthen rail transport in Europe, May 2022.
[10] IRG-rail (2021): Overview of the implementation of current rules relating to Temporary Capacity Restrictions m(TCRs) under Delegated Decision (EU) 2017/2075, November 2021.
[11] Ibid. p. 9.
[12] Ibid, p. 10.

Certainly, Infrastructure Managers can only undertake a systemic analysis if they have detailed information on the impact of TCRs on Railway Undertakings and Service Facility Operators. The consultation process in Annex VII of the Recast Directive allows for such an exchange to take place, but the Annex contains no specific rules on the information to be exchanged and the methodology to undertake such an analysis.

There is a clear role for Regulatory Bodies to supervise a more active role for Infrastructure Managers in the analysis of the optimum solution for the whole system. If Infrastructure Managers are expected to go beyond their own interests, firstly, incentives could be provided, and secondly, Regulatory Bodies would have to supervise that the systemic interest is taken into consideration. So far, action has been focused on the formal implementation of Commission Delegated Decision (EU) 2017/2075, with the Swedish and the German authorities being the most active. A coordinated harmonised approach would certainly be welcomed.

1.5. Conclusions

The EU regulatory framework on access to rail infrastructure has been effectively implemented. Infrastructure Managers have been separated from Railway Undertakings, and non-discrimination is ensured through a detailed capacity allocation process under the supervision of Regulatory Bodies. However, four challenges persist.

First, the allocation of capacity for international services is still a major roadblock. Capacity is allocated at national or subnational level by each Infrastructure Manager, and the coordination instruments in the Recast Directive and Regulation (EU) No 913/2010 on Rail Freight Corridors do not seem to be sufficient to guarantee proper access to capacity for cross-border services.

Second, allocation of capacity when infrastructure is congested poses even more pressing challenges. The EU procedures for congested infrastructure are not being fully applied as congestion declaration is still very rare across the EU. Furthermore, the EU framework does not define priority criteria for the allocation of scarce capacity, whereas national rules are not only different, but also insufficiently clear.

Third, newcomers, particularly to the passenger service market, perceive capacity as a barrier to entry. Head-to-head competition with the incumbent is not possible in the most popular routes if the newcomers can only have access to spare paths. In this way, it is not possible to build a timetable of services along the day with the right intervals.

Fourth, the management of Temporary Capacity Restrictions is another chapter where Infrastructure Managers are expected to take a more active role in identifying and implementing the optimum solution for the system, rather than a short-sighted reduction of their costs

There are initiatives promoting a more active role of Infrastructure Managers by previously organising or prearranging train paths that are later made available for Railway Undertakings. This is the case for international services under Article 40 of the Recast Directive, where train paths crossing more than one network have to be organised. The Recast Directive introduced the concept of the Framework Agreements to guarantee access to capacity for a period longer than one year, creating somehow path packages across time. This is also the case in France, where packages of train paths at regular intervals are organised to facilitate PSO services. Finally, in Spain, three packages of paths have been organised and put for tender to facilitate market entry to newcomers.

2. Service facilities: challenges posed by competition

Other than access to rail infrastructure, Railway Undertakings need access to a series of auxiliary spaces and services in order to provide their transport services. The Recast Directive regulates such services under the header of "service facilities".

The category of "service facilities" as defined in the Recast Directive includes very different physical spaces, such as passenger stations, freight terminals, terminals in ports, and maintenance facilities. Furthermore, it also includes the rail-related services provided in such spaces, such as maintenance services, cleaning and washing, etc.

The availability of service facilities and rail-related services is often a barrier to entry, as well as a barrier to grow. The current regulatory framework has been established to guarantee access to existing service facilities. Access regulation is inspired by track access rules, though the principles are different, for instance on pricing.

Even if different regulatory obligations are imposed on service facilities and rail-related services according to the typology created in the Recast Directive, reality has proven too heterogeneous to be accommodated in the scarce content dedicated to service facilities in the Recast Directive. As a consequence, the Commission adopted in 2017 Implementing Regulation (EU) 2017/2177, on access to service facilities and rail-related services[13]. However, the wide variety of facilities and services continues to pose challenges when interpreting the existing rules. Particularly relevant is access to passenger stations and maintenance facilities and services.

2.1. Service facilities

It is not always easy to draw a clear borderline between railway infrastructure and service facilities. The most relevant example has been the classification of platforms in passenger stations, which only after the Judgment of the CJEU in case C-210/18, on 10.07.2019, have been definitely classified as railway infrastructure the use of which is part of the minimum access package, in accordance with point 1(c) of Annex II in the Recast Directive. Similar doubts exist on the legal nature of rail-related infrastructure in maritime and inland ports, including the tracks, considered infrastructure or one (or several) service facility(ies)[14], and the classification of the place of loading and unloading for the transport of goods, including related tracks.[15]

The distinction is important for the following reasons: 1) Different rules might apply to the funding of assets (State aid rules), stricter on service facilities and looser on rail infrastructure exploited as a natural monopoly; 2) Planning and allocation of train paths or of capacity in service facilities follows different rules. (See Art. 38 et seq. and Art. 13 of the Recast Directive together with Implementing Regulation (EU) 2017/2177); 3) The rules for the calculation of access charges differ under Art. 31 of the Directive; and 4) Safety requirements might differ.

[13] Commission Implementing Regulation (EU) 2017/2177 of 22 November 2017 on access to service facilities and rail-related services (Text with EEA relevance)
[14] IRG Rail: (2021): *Regulatory practice for classification of tracks in the main maritime and inland port(s) in different European countries*, Nov 2021
[15] Pending request for a preliminary ruling CJEU Case C-453/20

Equally important is the classification of service facilities according to the three categories defined in Annex II of the Recast Directive: 1) Basic services; 2) Additional services and 3) Ancillary services, with a detailed description of assets and services in each category. Once more, borderlines are not always easy to draw: For example, should the handling of containers be considered a basic or additional service?

Again, the distinction is highly relevant, as it would imply different access conditions as defined in Article 13 of the Recast Directive. Basic services are under the strictest regime in terms of the obligations to provide access to assets and services, with detailed rules on accounting separation and even independence (but not necessarily establishing a separate legal entity), obligation to provide access (with detailed rules on refusals), non-discrimination obligation and rate regulation (the maximum rate is the full cost plus a reasonable margin). Additional services will be merely supplied upon request to Railway Undertakings in a non-discriminatory manner. While service facility operators are not obliged to provide ancillary services, in cases where they decide to do so, they shall supply them in a non-discriminatory manner. Rates for additional and ancillary services will only be regulated when they are offered only by one supplier (Art. 31(8) Recast Directive).

2.1.1. Description and publication

The operator of a service facility is any public or private entity responsible for managing one or more service facilities or supplying one or more services to Railway Undertakings as basic, additional and ancillary services. The operator can be 1) an Infrastructure Manager; 2) a Railway Undertaking; or 3) a third party. It is common to have subsidiaries of Infrastructure Managers and Railway Undertakings as Service Facility Operators.

Service Facility Operators shall establish a service facility description for the service facilities and services for which they are responsible. The description will include a list of all installations and services, the possibility for self-supply of services in the facility, information on procedures and key contacts.

The service facility description has to be published. Furthermore, since there might be a high number of service facility operators in a country, it has been considered convenient to consolidate information from all operators into the Network Statement produced by the Infrastructure Manager. The Network Statement might include the full description, or a link to the web portal with the description.

Infrastructure Managers are not, and should not be held, responsible for the content of the service facility description, produced by a third party Service Facility Operator, neither if service facility descriptions are published on a website and referred to via a link in the Network Statement, nor if they are provided to the Infrastructure Manager as “ready-to-be-published information“ and included directly in the Infrastructure Manager’s Network Statement”.[16]

2.1.2. Access to service facilities

Commission Implementing Regulation (EU) 2017/2177 defines a detailed procedure on access to service facilities, with exemptions for facilities of minor relevance, as granted by the Regulatory Body.

For a start, applicants will submit their requests to the service facilities’ operators. Requests for basic services will be coordinated with track access if they are consistent. An annual schedule for submitting the request might be set.

[16] IRG-Rail (2021): *Statement on the Responsibility of IM for Third Party Service Facility Descriptions in Network Statements*, May 2021.

The operator of a service facility shall acknowledge receipt of a request without undue delay and will respond to it according to the time limits defined by the Regulatory Body. When a request is in conflict with another request or an existing contract, the operator, through discussion and coordination with the applicants concerned, will attempt to ensure the best possible matching of all requests. They will encompass measures to maximise the capacity available in the facility, to the extent it does not require additional investment in resources or facilities, such as, 1) proposing alternative timing; 2) changing opening hours or shift patterns; or 3) allowing access to the facility for self-supply.

The Implementing Regulation allows, but does not oblige operators, to determine priority criteria to allocate capacity in the case of conflicting requests which cannot be accommodated after the coordination procedure. Such priority criteria shall be non-discriminatory and objective and published in the service facility description. Article 11 of the Implementing Regulation obliges to take into consideration the purpose of the facility, the purpose and nature of the railway transport services concerned and the objective of securing an efficient use of available capacity and proposes a list of criteria that might be taken into consideration. Once more, EU legislation does not impose a harmonised set of priority criteria, nor does it oblige to produce such a list. As a consequence, there are divergent practices, and operators struggle to identify the appropriate priority criteria.

Where the operator of a basic service facility and the applicant conclude that no viable alternative exists, and it is not possible to accommodate the request for access to or supply of a service in the facility following the coordination procedure, the Service Facility Operator may refuse the request. The applicant may complain to the Regulatory Body.

2.1.3. Joint operation

The operation of a service facility is often complicated by the fact that different entities might be jointly operating the facility. For example, an Infrastructure Manager might own the land of a maintenance facility, with the Railway Undertaking operating the buildings and equipment, and to complicate it further, a manufacturer actually leasing the equipment to provide maintenance services to newcomers.

Different entities may be in charge of deciding on access conditions for a service facility, allocating capacity in the service facility and supplying rail-related services in the facility. In such cases, all entities concerned are to be considered Service Facility Operators within the meaning of the Recast Directive. Each of them should meet the requirements in the Regulation for the part they are responsible for. If a facility is owned, managed and operated by several entities, only the entities effectively responsible for providing the information and deciding on requests for access to the service facility and use of rail-related services should be considered as the operators of the service facility.

In the case of service facilities operated by more than one Service Facility Operator or where services in the facility are supplied by more than one supplier, those operators or suppliers shall coordinate with each other in order to: 1) make available in one place their service facility descriptions; 2) indicate in their service facility descriptions all service facility operators responsible for deciding on requests for access to the facility or the rail-related services supplied in the same service facility.

2.1.4. Challenges

Some service facilities are particularly challenging, as has been the case of stations (see next section) and maintenance facilities. Maintenance facilities usually require a large space, not far away from a track, and sometimes, not far away from the main stations. Space in metropolitan areas is a scarce and expensive resource, so these spaces can become a barrier to entry for newcomers or incumbents wanting to expand capacity.

Incumbent Railway Undertakings have facilities at their disposal, either because they own them or because they have been benefiting from them for decades. Indeed, oftentimes these facilities are decades old, and do not have the most efficient arrangement.

2.2. Management of Stations

Stations are a fundamental element in the provision of rail passenger services. While Infrastructure Managers might generate a small fraction of their revenue in stations, they are a bottleneck in many major metropolitan areas for the expansion of rail services, and in particular, for newcomers to enter the market.

The main stations are congested with conflicting demands: from high-speed services, traditional long-distance services, suburban and regional PSO services, among others. Furthermore, the scarce available space has to be used for auxiliary services necessary for the provision of passenger services, such as ticketing and information, VIP waiting areas, assistance for people with reduced mobility, rolling stock cleaning services, logistics for onboard services (e.g., food and drinks). At the same time, convergence of large crowds in these stations makes space a very valuable asset for retail, advertising or car parking, reinforcing competition for such premium space among different users.

Competition poses a further challenge to the management of stations. As a result of it, congested spaces, both tracks and spaces supporting auxiliary services (ticketing, etc.) have to be shared with newcomers.

2.2.1. Different spaces under different regulation and divergent pricing

Under the current regulatory framework, stations can be operated by Infrastructure Managers, under separate accounting, by Railway Undertakings, as long as they are managed independently in case the Railway Undertaking holds a dominant position in that national transport market, or by other entities. There are different arrangements across the Union, and even inside each Member State.[17]

The Recast Directive regulates the use of space in stations according to different rules, based on the nature of the use of space. First, parts of the stations are considered rail infrastructure and they are included in the Minimum Access Package. This is the case of tracks and platforms[18].

Capacity allocation follows the general rules for track allocation: description in the Network Statement, requests from candidates, allocation procedure, coordination, priority rules in case of congestion, etc. However, pricing does not follow the general rule of covering direct cost plus what the market can bear. The Recast Directive allows station operators to cover all costs plus a reasonable profit (Art. 31(7) Recast Directive).

It has been identified that Railway Undertakings are sometimes interested in parking rolling stock in the main tracks in the station, particularly at night, rather than using storage siding facilities near the station, as it is more efficient timewise for their operations while at the same time allowing cost savings. Accordingly, they need more spaces in the platforms to serve the rolling stock (cleaning, etc.).

[17] For a description of the situation in the Member States see IRG- Rail (2019): *An overview of charges and charging principles for passenger stations*, November 2019.
[18] The CJEU has confirmed that platforms in stations have to be considered rail infrastructure for the purposes of the Recast Directive in the Judgment delivered on 10.07.2019, C-210/18.

Second, parts of the stations are reserved for the provision of basic service facilities. It is the case of station buildings, travel information display, and spaces for ticketing services, as described in Annex II(2)(a) of the Recast Directive. The allocation of these spaces, and the provision of such services, must follow the rules in Commission Implementing Regulation (EU) 2017/2177: information has to be published, allocation has to be coordinated with scheduled tracks granted by the Infrastructure Manager, a procedure is defined, in case of conflicting requests coordination has to be pursued, and in case it is not possible, priority rules have to be defined. The station operator is obliged to provide these services to Railway Undertakings under non-discriminatory conditions, and at a price that cannot be higher than the total cost plus a reasonable profit.

Third, other services provided at stations are considered ancillary services. This is the case of ticketing services (not spaces for the provision of such services by Railway Undertakings, but the actual provision of the service on behalf of a Railway Undertaking), and other services that might be requested by Railway Undertakings. The station operator is not obliged to provide such services, but if these are provided, the non-discrimination principle applies. Price regulation (total cost plus a reasonable profit) applies only when there is one single provider of the service. Otherwise, prices are not regulated. However, in such a limited space as a station, it is not common to have competition in the provision of services consisting in the renting of space. Usually it is the station operator who solely rents space in the station.

Practices across Member States have shown that it is not always obvious whether a service is basic or ancillary, or if an alternative category may even apply. To illustrate, experience shows that there are between 10 and 20 services provided in stations, exceeding the limited number of services specifically listed in Annex II in the Recast Directive.

Figure 9. Types of services

TYPE	DESCRIPTION
BASIC	SB 1 Train stabling services on tracks with platform for commercial services or other operations and sidings
	SB 5 Access to buildings and platforms at passenger transport stations for passenger use
	SB 7 Premises for attended Ticket Sales and Information Services
	SB 8 Space for Ticket Sales and Information machines
	SB 9 Premises for service personnel on board
	SB 10 ADIF ACERCA Service to assist people with disabilities and/or reduced mobility
ANCILLARY	SX 4 Spaces to provide attention services and timely information
	SX 5 Platform space for storing mobile equipment
	SX 6 Platform access control point
	SX 7 Last Minute Service Point
	SX 8 Lockers in shared use changing rooms
	SX 9 Lost and Found
	SX 10 Premises to attend preferred Clients
	SX 11 Logistics to load and unload services on board
	SX 12 ADIF ACERCA Service to assist people with disabilities and/or reduced mobility to step on and off trains

Source: Image produced by ADIF AV for the UIC Working Group.

There tends to be confusion as regards the classification of services in stations and, divergence across Member States, with relevant regulatory consequences. For example, assistance services can be considered basic or ancillary services in Spain (depending on the segment of the service). In Italy, on the other hand, they are neither of them, but rather additional services, a third category of

service facility services in Annex II of the Directive, together with fast-track services. There are also doubts regarding the nature of information posters, which in Italy are considered ancillary services, whereas in Czechia they are not considered to be under the service facilities regulation.[19]

Even if the Recast Directive allows station operators to recover the full cost generated by the station plus a reasonable profit, this is not always the case. According to IRG-Rail "In 10 countries, the station charges do not recover the full costs of passenger stations. In at least 5 countries, the provider of passenger stations receives public subsidies for providing the stations".[20]

The cost accounting varies considerably across the European Union. There are no common principles for the definition of costs (historic costs, replacement costs), for the identification of the relevant costs to be taken into consideration, for the distribution of common costs, etc.

The pricing applied across the European Union is also very different (See Section III.3). Different criteria are used by station operators: number of passengers, number of platforms, metropolitan vs non-metropolitan, waiting rooms, length of platforms, type of train, terminus or non-terminus station and other criteria are used to determine prices. It is common to define different station categories, with up to 196 in Germany.[21] Furthermore, in some Member States a basic charge is set, comprising most services, while in other Member States services are unbundled for pricing purposes.

2.2.2. New challenges posed by competition

Competition poses new pressure on Service Facility Operators, as they have to provide newcomers access to facilities, mostly at regulated rates, and under the non-discrimination principle. Non-discrimination is the fundamental principle guiding the management of spaces in stations for the provision of rail services.

However, the EU regulatory framework does not establish clear guidance on the distribution of spaces when these are congested, and some requests have to be rejected due to space shortages. EU rules on airport management establish detailed rules for the prioritisation of slot requests, privileging incumbents as their "grandfather rights" are prioritised over requests from newcomers. For stations, however, the EU regulatory framework does not establish grandfather rights nor does it grant priorities for newcomers. No priorities are set at the EU level, and Commission Implementing Regulation 2017/2177 merely allows, without obliging, operators to define priority criteria, which should in any case be non-discriminatory and transparent and be published in the service facility description, which is subject to review by the regulatory body. They shall take into account the purpose of the facility, the purpose and nature of the railway transport services concerned and the objective of securing an efficient use of available capacity (Art. 11).

As a result, the relationship between station operators and newcomers can rapidly become conflictual. This was the case in Italy back in 2012 when the Italian passenger rail market witnessed the entry of a new operator, Nuovo Trasporto Viaggiatori (NTV), on the high-speed rail market segment coming into direct competition with the incumbent State-owned operator Trenitalia. The Italian market was the first and most extensive case in Europe where two railway companies competed for high-speed rail services on an open access basis using the same tracks and stations.

[19] A request for a preliminary ruling is pending before the CJEU on the classification of paper posters featuring trip information, C-104/21, *RegioJet A.S. v Ceské dráhy a.s.*

[20] IRG- Rail (2019): *An overview of charges and charging principles for passenger stations*, November 2019, p. 16.

[21] Ibidem, pp. 18-19.

Access to stations, even to tracks part of the Minimum Access package, was an issue in the early days of competition in the market. NTV tended to operate in secondary stations, particularly in Rome, and not in Roma Termini.[22] Access to the stations became a reason for conflict[23].

Moreover, NTV complained about discrimination with respect to the allocation of spaces within railway stations, for instance about spaces for ticket machines. The Antitrust Authority had issued several reports to clarify relevant matters about the access to the infrastructure. Subsequently, in May 2013, it launched a comprehensive investigation to establish whether RFI and Trenitalia abused of their powers. On March 12, 2014, the Italian Competition Commission (AGCM) closed the investigation, concluding that no evidence of abuse was found in the allocation of slots and spaces. The Italian case is one illustrative example underlining the importance of the regulator independence from the infrastructure owner and from the incumbent Railway Undertaking.[24]

The Italian Infrastructure Manager developed a more active management of stations to put an end to these conflicts. Based on this experience, and to facilitate the management of spaces in the stations, RFI now issues a "station utilisation plan", updated annually, in the large stations in Italy (i.e., those with more than 50 passenger services per day), after consultation with the interested parties. This is another example of how a more active management of infrastructure facilitates market entry and reduces conflict.

A more active management by the station operator can reduce friction by proactively identifying Railway Undertakings' needs, optimising the available capacity, and ensuring *ex ante* that such demands are met in a transparent and non-discriminatory manner.

The Spanish Infrastructure Manager, ADIF, has adopted this active management approach in their stations. Since market entry by newcomers was actively managed by ADIF through Framework Agreements (see above section II.3 Active infrastructure management), ADIF was in the position to actively manage the auxiliary services at stations before market entry, implementing an *ex ante* strategy. Such *ex ante* strategy started with consultations with the incumbent and the two newcomers, on equal footing, with a view to identify their demands. Despite ADIF's long-lasting experience in stations operation, the newcomers identified new needs and new means to operate services. Consultations allowed ADIF to define the spaces and services that would be provided to Railway Undertakings. The granularity of such services goes beyond the list of services in the Recast Directive, as 15 different services were defined.

A good example of a service which is not specifically defined in the Recast Directive is the renting of space for VIP waiting rooms. ADIF makes space available for Railway Undertakings to operate their own VIP waiting rooms in separated spaces in the main stations. Such a service is considered an ancillary service. The Regulatory Body has requested that such spaces should be available to all Railway Undertakings, and that spaces should have equivalent status to avoid discrimination. Finally, renting prices are subject to regulation, as ADIF is the only provider of the service, so prices should not exceed total costs plus a reasonable profit.

More relevant is that, following consultations, ADIF decided that some services, traditionally self-provided by the incumbent Railway Undertaking, would have to be optimised. Even against the will of some of the Railway Undertakings, ADIF resumed the provision of two services: 1) logistics to load and unload onboard services (mostly food and drinks); and 2) assistance to passengers with reduced mobility.

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[22] Bergantino, Capozza & Capurso, (2015): The impact of open access on intra- and inter-modal rail competition. A national level analysis in Italy, *Transport Policy* https://www.sciencedirect.com/science/article/abs/pii/S0967070X15000219

[23] Desmaris, C. & Croccolo, F. (2018): The HSR competition in Italy: How are the regulatory design and practices concerned?, *Research in Transportation Economics*

[24] Desmaris, C. (2016): "High Speed Rail Competition in Italy: A Major Railway Reform with a "Win-Win Game"?", *International Transport Forum Discussion Papers*, No. 2016/11, OECD Publishing, Paris, https://doi.org/10.1787/6da6e5ca-en.

ADIF concluded that it was not viable to have three different entities managing vehicles carrying goods for onboard services in the six main stations in the network. The incumbent had previously managed such services, but there would be no room for two other entities managing their own vehicles, particularly as platforms are too narrow to accommodate two vehicles at a time. Consequently, ADIF decided that it would not grant to Railway Undertakings the right to use space in the stations for the self-provision of the logistics service. Instead, the right to use the space in the station would be granted after a tender to a single company, and this company would then provide the service to the Railway Undertakings. All catering providers would take the goods to a cross docking point, from where the ADIF-appointed company would transport them inside the station to the relevant train.

The Regulatory Body pointed in the review of the Network Statement for 2021, that the single provider appointed by ADIF would be considered a service facility operator,[25] under the non-discrimination and pricing obligations in the legislation (total cost plus reasonable profit), and that Railway Undertakings would have the right to participate in the definition of the tender conditions to appoint the single provider of the service. Despite initial opposition, Railway Undertakings finally understood that their ability to select their catering provider would not be compromised, and that costs for transport inside the station would diminish for them.

Similarly, ADIF decided that the service to assist passengers with reduced mobility would not be self-provided by Railway Undertakings, as it has been in the past with the incumbent. Instead, ADIF would resume the provision of this service for the three Railway Undertakings in competition, while meeting the requirement in Regulation (CE) 1371/2007 (Art. 22(1)). Possibly because this Regulation imposes the obligation to provide the service on the entity managing the station, the service has been considered as a basic service.

Furthermore, along the consultations ADIF identified that Railway Undertakings might be interested to self-provide part of the service (assistance to step on and off trains and inside trains, as defined in Article 23 Regulation 1371/2007). Therefore, the service has been unbundled into two separated segments, which can be contracted separately, with different prices: one segment from the meeting point to the train, and another segment once in the train. This last service is considered an ancillary service, possibly because Regulation 1371/2007 imposes the obligation to provide it not on the station operator, but on the Railway Undertaking.

The decision to optimise these services by resuming the provision by ADIF (or a contractor), as well as the tendering to appoint the contractor and the price to be charged to Railway Undertakings, were always supervised by the Regulatory Body, CNMC. In this way, full compliance with the regulatory framework, as well as the rules on competition, was guaranteed.

ADIF called for requests from Railway Undertakings to be met through a coordination process. Only in case coordination would not be possible, assignments would be made according to the following priority criteria: 1) existing contracts on services or areas that are a priority and with a signed Framework Agreement; 2) Railway Undertakings that already have existing contracts on services or areas that are a priority and do not have a Framework Agreement; 3) Railway Undertakings with a Framework Agreement without existing contracts on services or areas to prioritise; and 4) Railway Undertakings without a Framework Agreement and without existing contracts on services or areas to prioritise.

This *ex ante* strategy, part of a more active management of the service facility, has helped market entry by newcomers while reducing friction, as no formal complaints have been raised so far to the Regulatory Body.

[25] CNMC (2021): *Acuerdo por el que se emite informe relativo a la actualización de la declaración sobre la red 2021 de ADIF Alta Velocidad*, DTP/DTSP/019/21, 6 May 2021.

2.2.3. Commercial activity in stations

Not all space in stations is under the obligations in the Recast Directive, either as rail infrastructure or as service facilities. There is a further category of spaces, disconnected from rail services, which is leased for commercial purposes, mostly to retail activities but also to other uses such as car parking and advertising.

Figure 10. Types of service facilities in a station

Source: Image produced by RFI for the UIC Working Group.

An important question is how to differentiate spaces in stations under the service facility regulation and unregulated commercial spaces. The Recast Directive merely classifies buildings in passenger stations as service facilities, but in reality, it can be observed that in many Member States, unregulated revenue for the exploitation of commercial space in the stations is thriving. Station operators across Europe are following the example of airports by resorting to a more aggressive exploitation of the station for commercial purposes. This offers a possibility to increase revenue and finance not only maintenance, renewals and upgrades, but also the development of new infrastructure, thereby increasing capacity in the station.

The long-lasting debate in airport regulation on single till vs dual till[26] can be extended to stations. The Airport Charges Directive 2009/12/EC leaves it up to Member States to "determine if and to what extent revenues from an airport's commercial activities may be taken into account in establishing airport charges"[27]. Infrastructure Managers tend to defend their ability to manage commercial space in stations without regulatory limitations, particularly on prices (dual till). Transport service providers, on the contrary, tend to defend that revenue from the commercial exploitation of the stations should be taken into consideration for the rate regulation of the service they contract (single till), leading to rate reductions as commercial revenue increases.

[26] Estelle Malavolti. (2016): Single Till or Dual Till at Airports: A Two-sided Market Analysis, *Transportation Research Procedia*, volume 14, 3696-3703.
[27] Directive 2009/12/EC of the European Parliament and of the Council of 11 March 2009 on airport charges, Document 32009L0012.

Once more, there are different solutions across the European Union on the regulation of commercial spaces. While some countries have traditionally imposed single till (Portugal and UK), or hybrid dual-till (France and Italy), most Member States have dual-till approaches.28

Finally, it could be necessary to limit usage in spaces rented to Railway Undertakings for basic and ancillary services (ticketing, information services, VIP waiting rooms) under regulated conditions (maximum rate regulation). If purely commercial services are provided in such spaces, they would benefit from lower rents (prices linked to the cost of supply/cost plus reasonable profit) vis-à-vis competitors renting spaces at (premium) market prices.

2.3. Traction current management

Another service facility which is creating regulatory challenges is the one of providing traction current. The existing regulatory framework considers the provision of traction an additional service, to be offered in competition. However, it is common for Infrastructure Managers to be the sole providers of the service. Dissatisfied with increases in electricity prices, Railway Undertakings, particularly in Member States where competition has emerged, are proposing changes in the way electricity is provided by Infrastructure Managers.

Further regulatory challenges are posed by the increasing interest of Infrastructure Managers to generate their own electricity, in order to not only to feed it into the railway system, but also provide it to third parties. This, in turn, might trigger the application of the complex regulatory framework designed for electricity utilities.

2.3.1. The rail regulatory framework

The Recast Directive differentiates two different regimes when it comes to electricity. Firstly, electricity-related infrastructure is part of the minimum access package. Secondly, the provision of the electricity itself is considered a service facility, and more specifically, an additional service.

Firstly, electricity is considered part of the railway infrastructure according to Annex I, i.e., the plant for transforming and carrying electric power for train haulage, which includes the following assets: substations, supply cables between substations and contact wires, catenaries and supports, as well as the plant for generating, transforming and distributing electric current for signaling and telecommunications. Furthermore, the Recast Directive includes the use of electrical supply equipment for traction current, where available, as part of the minimum access package (Annex II(1)).

Infrastructure Managers have to provide access to these infrastructures and services as to the rest of the rail infrastructure, i.e., it has to be described in the Network Statement, it has to be provided on a direct cost plus mark-up basis, etc. For the calculation of direct costs, electric supply equipment such as cables or transformers are generally not subject to wear and tear by the operation of the train service. These are neither exposed to friction nor to other impacts caused by the operation of the train service. Therefore, these costs of electric supply equipment should not be included in the calculation of costs directly incurred by an operation of the train service. However, trains, when they use electric traction, wear down the contact medium (overhead wire or the electrified third rail) due to friction and the electric arcs they cause. Consequently, a part of the maintenance and renewal costs of these contact mediums could be considered as directly incurred by operation of the train service. Maintenance and renewal costs of other components of overhead line equipment can also degrade as a direct result of traffic movements which cause electrical and mechanical stress (recital 10 of the Commission Implementing Regulation 2015/909[29]).

[28] IRG- Rail (2019): *An overview of charges and charging principles for passenger stations*, November 2019.
[29] Commission Implementing Regulation (EU) 2015/909 of 12 June 2015 on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service.

Secondly, the provision of traction current, that is, not the infrastructure, but electricity that is consumed by Railway Undertakings, is considered a service facility, and more concretely an additional service. Furthermore, the Recast Directive imposes on Service Facility Operators to display charges for the provision of this service in the invoices separately from charges for using the electric supply equipment (Annex II(3)).

Here it is important to recall that Service Facility Operators have the right to decide whether to provide such additional services or not, and should they decide to provide them, these shall be supplied upon request to Railway Undertakings in a non-discriminatory manner (art. 13(7) Recast Directive).

As regards pricing, Service Facility Operators traction current shall be provided at a price that does not exceed the cost of providing it plus a reasonable profit when the Service Facility Operator is the only provider, but in case there is an alternative provider, no price regulation shall apply (Art. 31(8) Recast Directive).

National Regulatory Bodies have intervened in the past to solve disputes on the provision of current traction. In Germany, in 2010, the decision by the Regulatory Body to regulate the charges for traction current was enforced by Courts, leading to a price reduction of 11 percent in 2013 for traction current. In Croatia, complaints by Railway Undertakings HŽ Putnički prijevoz and HŽ Cargo on the Network Statement 2014, including […] methodology for calculating traction current were filed.[30]

2.3.2. Current challenges

Infrastructure Managers have very different strategies regarding electricity. Some Infrastructure Managers are generating up to 90% of their electricity (e.g., Switzerland), while other Infrastructure Managers do not generate electricity but merely acquire it from third parties, usually through tenders, and then pass the cost of acquisition plus a management fee (the reasonable profit) to Railway Undertakings.

In principle, the provision of traction current is an additional service to be provided in competition. Railway Undertakings should be able to acquire the service from Service Facility Operators other than the Infrastructure Manager. However, this is not always the case, as Infrastructure Managers are not always in the position to admit alternative Service Facility Operators to feed electricity into their infrastructure, and in the case they do, dedicated counters are to be installed in rolling stock to measure consumption, which often does not happen in reality.

Actually, as electricity prices have drastically increased across Europe during 2022, traction current is becoming a more relevant cost for Railway Undertakings. Newcomers, in particular, are stressing the threat high electricity prices pose to their business models. For instance, Ouigo in Spain has been particularly vocal, claiming that electricity prices have multiplied by four, which in turn has driven the total cost of the high-speed passenger service up by 30 percent. Consequently, they argue they should be able to directly acquire electricity in the market, as SNCF can do in France.[31] Renfe claims that electricity costs in passenger high-speed services have gone up from 7 percent of total costs to 20 percent.[32]

[30] Independent Regulators' Group – Rail IRG–Rail Annexes to the 3rd IRG-Rail Annual Market Monitoring Report March 2015.
[31] The Objective (April 2022): La francesa Ouigo se compromete a mantener los precios pese a disparar su gasto energético, retrieved on June 13th, 2022: https://theobjective.com/economia/2022-04-11/ouigo-precios-espana/
[32] Economía Digital (June 20922): Renfe, Ouigo e Iryo se enfrentan a los precios récord de la luz con las manos atadas, retrieved on June 30th, 2022: https://www.economiadigital.es/empresas/renfe-ouigo-iryo-precio-luz.html

Newcomers seem to have a preference for directly contracting the provision of traction current, as they are able to choose from the different options electricity companies provide: they can chose to contract prices on the spot, which tend to be more volatile, or to enter into long-term contracts, e.g., contracts with fixed rates, contracts for the provision of electricity generated in solar plants and wind farms, which tend to be more stable in prices, etc.

Infrastructure Managers have very different incentives to allow Railway Undertakings to directly acquire electricity from other vendors depending on whether they are to generate their own electricity or to acquire it from third parties. If an Infrastructure Manager is not generating electricity, it has less of an incentive to hinder the provision of electricity from third parties. For instance, ADIF supports the needed regulatory changes in order to allow Railway Undertakings to acquire electricity in the market. As these are yet to come, in the meanwhile ADIF is searching for ways to let Railway Undertakings participate in the electricity purchase and take their own decisions regarding price-hedging, after a request from the regulatory body CNMC.

As railways are one of the main electricity consumers in most Member States, and modal shift a fundamental policy in the Green Deal, there are voices asking for the inclusion of railways under some of the special regimes defined at EU and national levels to protect consumers from price increases, including the declaration of railways as an electro-intensive industry. It has been calculated that railways pay around €500 million into the EU Emission Trading System.[33]

In parallel, there are different proposals to optimise the use of electricity by the railway industry, including the development of smart grids and the generation of electricity from braking systems, among others.

2.3.3. Regulatory challenges in generating electricity

Infrastructure Managers are increasingly considering generating their own electricity. Some of them have traditionally relied, at least partially, on their own generation assets. Many of them are considering using their extensive properties to install equipment for the generation of renewable electricity, for instance though solar cells. Such electricity could be used to power the electricity system, but further than that, some Infrastructure Managers are considering providing electricity to third parties, i.e., installing electric vehicle chargers in stations and even providing electricity to the general public.

Infrastructure Managers have often been present in the segment of electricity generation. There is a long tradition in the railway sector to develop itself as an autonomous system. Generating the traction current would be part of this effort. Eventually, the railway system is one of the main electricity consumers in most member States, so Infrastructure Managers have an incentive to optimise this important cost center.

Infrastructure Managers are increasingly opting for and considering a more active role in the generation of electricity. As Infrastructure Managers typically dispose of spacious facilities and land, this positions them well to generate electricity by installing solar cells on the roofs of their premises, as well as deploying solar and wind farms.

[33] RailFreight.com (December 2021): Whay energy prices are rising, and how rail can be protected, retrieved on Junbe 30th, 2022 https://www.railfreight.com/policy/2021/12/21/why-energy-prices-are-rising-and-how-rail-can-be-protected/?gdpr=accept

The electricity generated by Infrastructure Managers can be used for self-consumption, for traction current to be consumed by Railway Undertakings, or alternatively it can be sold to third parties outside the railway system. For instance, there are plans across Europe to install chargers for electric vehicles in passenger stations and other rail infrastructures. There are obvious complementarities, particularly with e-bikes and park & ride schemes. It is widely recognised that the deployment of electrical recharging points in cities should make use of existing infrastructures such as railway stations and connections to the electric infrastructure which are already in place for public (and private) transportation. Besides further enhancing inter-modality, such reliance on existing infrastructure can help to reduce the need for civil works for new grid connections as well as the associated costs.

In some cases, as Infrastructure Managers have developed a solid system for the provision of electricity, often green electricity, and in order to gain further scale, which allows to reduce costs, it is even considered to sell electricity to the general public. Deutsche Bahn is already doing so.

It is commonly understood that providing traction current to Railway Undertakings is part of the role of Infrastructure Managers and it does not include them under the scope of electricity regulation. However, when electricity is provided to third parties, the situation changes, and electricity regulation, with its vertical separation obligation, and convoluted mechanisms to meet supply and demand apply. This might be a regulatory challenge for rail Infrastructure Managers.

2.4. Conclusions

The EU regulatory framework includes all auxiliary spaces and services under a common category of “service facilities”. Since this is a very heterogeneous group, ranging from stations to traction current, different categories have been created, with different obligations.

A challenge posed by the existing regulation is the classification of assets and services, first as rail infrastructure or service facilities, and subsequently, in the different categories of service facilities.

Another challenge is the divergence in the application of the EU regulatory framework across Member States. This regulation is not as detailed as the rules on track capacity allocation, so implementation has left more space for Member States to set their own rules.

Finally, competition poses specific challenges. Incumbents and newcomers compete for the same spaces. Maintenance facilities often need to be placed near large stations in scarce and expensive land around metropolitan areas. The main stations have limited space for all the services required by Railway Undertakings (from parking to ticketing, etc.). The existing regulatory framework lacks clear rules for the allocation of space in service facilities. Railway Undertakings and Infrastructure Managers are becoming more active in the acquisition of electricity, as prices have increased over the last months but there are still regulatory challenges that may be addressed when electricity is provided by third parties.

As a response, Infrastructure Managers in countries with a more vigorous competition are increasingly opting for a more active management of service facilities. For example, in Italy station utilisation plans are drafted by RFI for the large stations. In Spain, ADIF organised common services such as logistics to load and unload onboard services and assistance to passengers with reduced mobility.

3. The economic framework

3.1. Track access charges

Track access charges are regulated in Directive 2012/34/EU (Recast Directive). Different rules are defined for the so-called Minimum Access Package (MAP), which includes the main elements for a Railway Undertaking to provide services (track paths, train control and electricity infrastructure, as defined in Annex II of the Directive), and for the rest of infrastructure services, which are under different rules depending on their classification as service facilities (including stations, freight terminals, maintenance facilities, traction current and so on).

The Recast Directive differentiates between three pricing elements for the Minimum Access Package: 1) direct costs; 2) mark-ups; and 3) other pricing elements. EU legislation leaves significant room for interpretation, something that has led to considerable differences in track access charges across Member States.

3.1.1. Direct costs

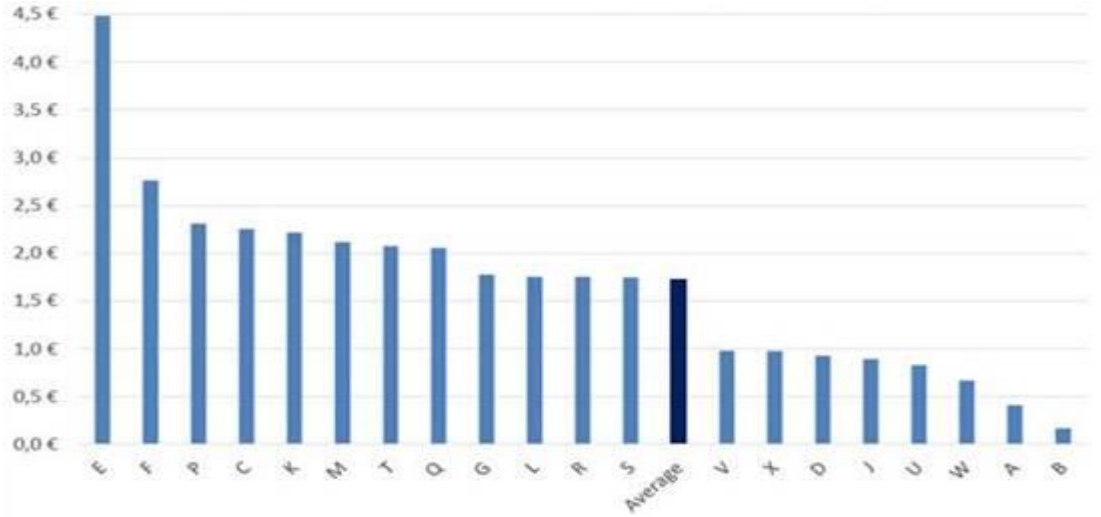
The point of departure for the definition of track access charges is the calculation of the direct cost for the use of the infrastructure, defined as "the cost that is directly incurred as a result of operating the train service" (Art 31(3) Recast Directive). Indeed, the EU legislation allows Infrastructure Managers to charge only direct costs to Railway Undertakings. Such costs cover only a fraction of the total cost. In fact, as in all infrastructure industries, the main cost drivers are the fixed costs related to the construction and maintenance of the infrastructure, not the variable costs derived from their use.

Charging only direct costs leads to low track access charges; according to the European Commission this "ensures the optimum effective use of available infrastructure capacity" (recital 12 of the Commission Implementing Regulation 2015/909[34]). Some Member States have opted for charging only direct costs, prioritising the intensive use of infrastructure over cost recovery. Obviously, the lower the access charges, the higher the need for public grants to make up for the difference between revenue and total costs.

Furthermore, EU legislation has granted wide discretion for the calculation of direct costs, which has resulted once again in diverging results across the European Union. The Commission Implementing Regulation 2015/909 states that Infrastructure Managers "may decide to use the proxy of marginal cost for calculating its costs directly incurred as a result of operating the train service" (recital 12). The Implementing Regulation also allows different calculation methods: (1) econometric modelling; (2) engineering modelling; and (3) accounting. Nevertheless, the Implementing Regulation specifies the non-eligible costs, including financing costs, depreciation costs, which are not determined on the basis of real wear and tear of infrastructure, etc. (Art. 4). Figure 11 highlights how direct costs diverge across the Union.

[34] Commission Implementing Regulation (EU) 2015/909 of 12 June 2015 on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service.

Figure 11. Direct costs of the Minimum Access Package per country in €/trkm



Source: IRG-Rail (2019): Benchmark on Financing of Main Railway Infrastructure Managers in Selected European Countries, position paper 19(9), November 2019, p. 21.

The cost accounting methodology explains a significant part of the divergence across countries. Certainly, the underlying circumstances in each Member State lead to different costs. For instance, networks with a high share of high-speed infrastructure, or with a high share of heavy freight trains, will have higher direct costs. However, a substantial part of the divergence derives from the cost accounting methodology. On the one hand, some countries exclude renewals from the calculation of direct costs, thus substantially reducing them. On the other hand, engineering models, based on assumed costs, produce direct costs much lower than econometric models, which rely on actual costs[35]. The divergence spans from the attribution of less than 10 percent of wear and tear costs in some UK engineering models to close to 50 percent in other models (Smith, 2015???).

As a conclusion, countries that opt to charge only direct costs, calculate them using engineering models and exclude renewal costs, will end up with very low track access charges, independently of the total cost of the infrastructure. Such low prices require substantial public grants to balance the financial situation of the Infrastructure Manager.

3.1.2. Mark-ups

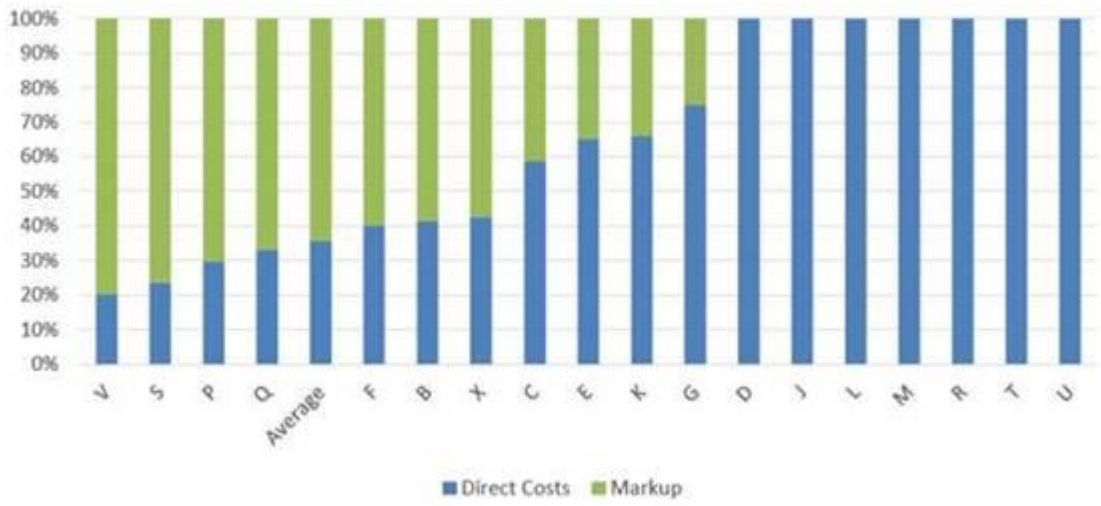
The second price element in the Recast Directive is mark-ups added on top of direct costs. Marginal cost pricing will not cover a substantial part of infrastructure costs. The theoretic alternative was to add mark-ups, but in order not to reduce social welfare, mark-ups would be calculated according to the price elasticity of the product. When demand would be substantially reduced due to price increases, no mark-ups or low mark-ups would be added to the marginal cost price. Conversely, when products have a low price elasticity, they are in the position to bear larger mark-ups so as to recover a fair share of the total cost, without causing a quantity reduction in consumption (Ramsey-Boiteux pricing).

The Recast Directive, based on these solid theoretic grounds, allows Infrastructure Managers to levy mark-ups on top of direct costs “in order to obtain the full recovery of the costs incurred by the Infrastructure Manager” (Art. 32(1)). The mark-ups can be applied only “if the market can bear this”, that is, if they do not exclude the use of the infrastructure by specific market segments. Furthermore, the mark-ups must be efficient, transparent and non-discriminatory.

[35] Chris Nash (2018): Track Access Charges: Reconciling Conflicting Objectives - Project Report, CERRE, available at https://cerre.eu/publications/track-access-charges-reconciling-conflicting-objectives/.

Member States are not required to charge mark-ups. It is only a possibility allowed by the EU legislation under strict conditions. Furthermore, EU legislation does not identify rules for the calculation of mark-ups. Economic theory suggests that they should be based on social marginal costs, but these are not easy to identify. As a result, a further divergence is introduced in track access charges across EU countries. Several Member States charge no mark-ups, while in other Member States mark-ups amount to more than half of the total track access charges.

Figure 12. Share of direct costs and mark-ups on total charges for all train services



Source: IRG-Rail (2019): Benchmark on Financing of Main Railway Infrastructure Managers in Selected European Countries, position paper 19(9), November 2019, p. 29.

3.1.3. Discounts to increase traffic

As competition is introduced in the provision of rail services, Infrastructure Managers might consider a more commercial approach for the definition of track access in order to incentivise traffic. Discounts can be provided for Railway Undertakings committing to increase traffic. Such discounts, however, can have a distortive effect. The experience in aviation can provide valuable learnings.

It is a common commercial practice in the private sector to offer discounts to customers to increase demand. A reduction in unit prices might trigger more consumption and an increase in total revenue. European rail Infrastructure Managers do not intensively use such techniques, with some exceptions including private Infrastructure Managers as LISEA in France, with a more commercial approach. They are common among other transport Infrastructure Managers, particularly airports.

Airport managers have identified that airport revenues are closely linked to usage intensity, while costs increase more slowly with increased traffic because of the high fixed cost element (as long as there is spare capacity). Targeted rebates can therefore increase traffic and even revenue, without substantially increasing costs. A similar reasoning applies to railway infrastructures, particularly when charges go beyond direct costs. Volume incentives are very common in airport charges. According to some sources, 73 percent of European airports have implemented some kind of volume discount[36]. Discounts can take different forms. Volume discounts can be granted to airlines that exceed certain thresholds in total terms (mostly number of passengers per year). Volume discounts can be more sophisticated, targeting not total volumes, but year to year increases in the number of passengers (base volume discounts).

[36] ACI Europe (2019), Contribution to the Commission public consultation on charges for the use of airports.

Similarly, discounts are offered in many airports for the introduction of new destinations: 83 percent of European airports have implemented some kind of new route discount (ACI Europe, 2019). These incentives are usually limited in time. A similar scheme is the introduction of discounts when frequencies in services connecting two cities are increased.[37]

Although publicly available and open to all undertakings, some incentives may be implicitly discriminating. For example, new entrants may not be able to benefit from volume incentives, while incumbents may not stand to benefit from base volume discounts. In certain situations, volume incentives might be seen as a barrier to entry to newcomers striving to operate new services. On the other hand, a new entrant might be better placed to benefit from the new destination or more frequencies incentives. Therefore, some incentives in airport charges have been declared to be "controversial" by the European Commission.[38]

3.2. Financing railway infrastructure

Track access charges are important because they are at the center of the financial relationship between Infrastructure Managers and Railway Undertakings. This is why divergences in track access charges across the European Union reveal fundamental differences in the financial organisation of national railway systems.

Some Member States have as an objective to recover infrastructure costs through track access charges, in order to be passed on to passengers through high ticket prices. The objective is to reduce the burden for the taxpayer. This is certainly the scope of the reduced number of private Infrastructure Managers, as LISEA in France. LISEA is a private company that entered into a 50-year concession contract for the design, construction, financing, operation and maintenance of the South-Europe Atlantic high-speed rail line (HSL SEA). LISEA has raised 3.8 billons euros from commercial banks, European Investment Bank and private investors to finance the construction of the HSL SEA between Tours and Bordeaux in France which has been put in operation in July 2017. LISEA has no public support (i.e. it does not have any subsidies during operation period and is not compensated by the State for any loss of revenue). The only revenues are the track access charges. The charging regime of LISEA's concession is based on the long term costs regime (article 32,§3 of Directive 2012/34) and includes an investment recovery charge dedicated to cover the reimbursement of the investment made to build the HSL and a train running charge to cover operation and maintenance costs. Other Member States have as an objective to promote the use of rail services though low track access charges that result in low prices for passengers.

Things can get more complicated. In certain Member States high track access charges are neutralised as a large part of the cost is shouldered by public authorities in the form of PSO compensations. In other Member States, high track access charges are not sufficient to cover the cost of the infrastructure, usually due to expansions in the network that the government has not fully funded.

While different models can be stable in themselves, the divergence poses challenges for international services. Not only is it complex to calculate track access charges along the route, but high track access charges in certain parts of the route might pose a risk in the provision of the service, particularly if they cannot be compensated in the form of PSO compensations.

[37] Steer Davies Gleave (2017). Support study to the Ex-post evaluation of Directive 2009/12/EC on Airport Charges, Final report, prepared for the European Commission, available at https://op.europa.eu/en/publication-detail/-/publication/8e6db69a-e601-11e7-9749-01aa75ed71a1.

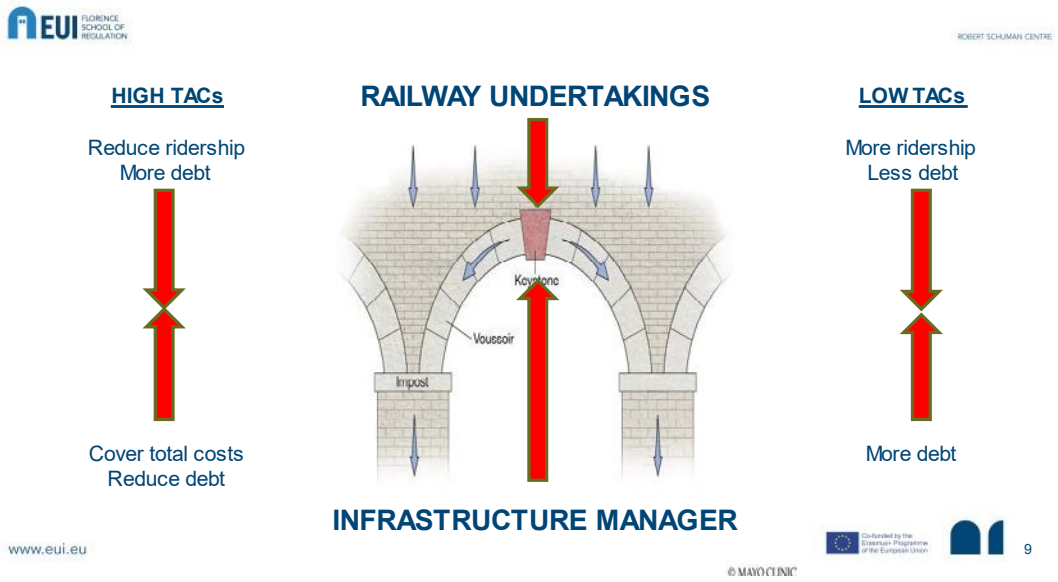
[38] Report from the Commission to the European Parliament and the Council on the application of the Airport Charges Directive, COM(2014) 278 final, 19.5.2014.

The ultimate risk for Infrastructure Managers is that the different revenue sources, track access charges, public subsidies and other minor sources, are not enough to cover the costs of the operation of the network. The Recast Directive imposes on Member States the obligation to balance the accounts over a five-year period. Not all Member States are meeting this obligation, and the institutional response by the Commission and the Regulatory Bodies has been rather mild.

3.2.1. Track access charges as the cornerstone of the system

Track access charges are only one of the prices in the railway sector, but they act as the cornerstone of the system created by EU regulation. They govern the economic relationship between Infrastructure Managers as supply and Railway Undertakings as demand, sending incentives to both sides.

Figure 13. Track access charges as the cornerstone of the system



Source: Image produced by FSR for the UIC Working Group.

Divergence in track access charges is not a mere problem of harmonisation, but the evidence of different policies for the sector.[39] In some Member States, the main objective determining the amount of track access charges is cost recovery. This is the case of France, Germany and Spain. The higher the access charges, the higher the share of total infrastructure costs covered by them. On the contrary, in other countries, the main objective is to facilitate the intensity of use of the existing capacity, as is the case in Sweden[40] and other Nordic countries as well as most Eastern European countries.

These two objectives, cost recovery and intensity of use of the capacity, are somewhat in conflict. High track access charges tend to disincentivise the more intensive use of the infrastructure, whereas low access charges tend to be insufficient to cover the cost generated by the infrastructure. The most fundamental challenge in the management of all kinds of infrastructure, not only railways, is to reconcile cost recovery with the objective to incentivise the most intensive use of the infrastructure.

[39] Nash, C. (2018): Track Access Charges: Reconciling Conflicting Objectives - Project Report, CERRE, available at https://cerre.eu/publications/track-access-charges-reconciling-conflicting-objectives/

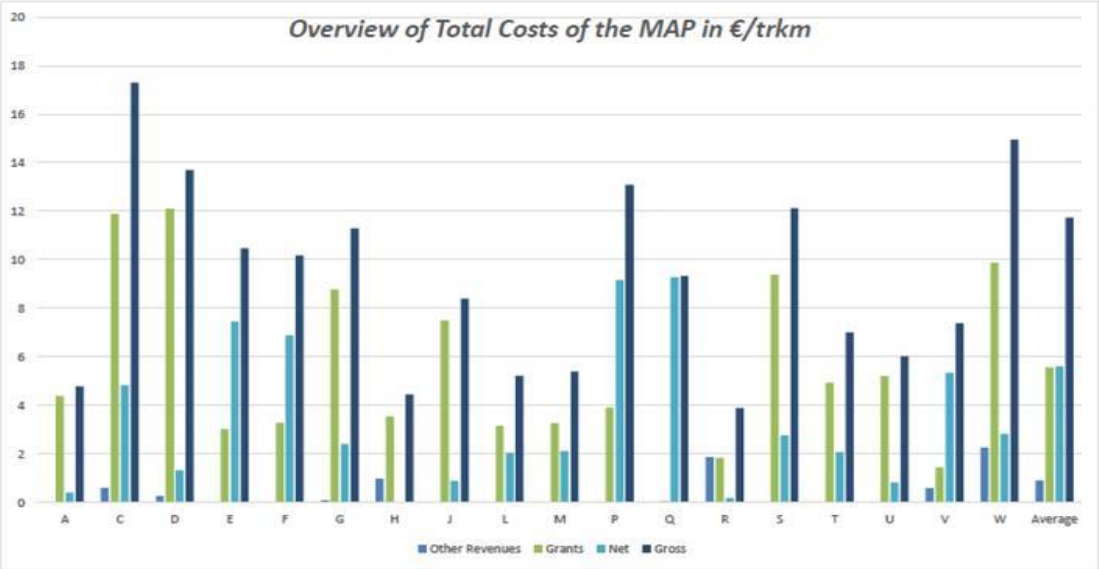
[40] Nilson, J. E. (2018): Track access charges: reconciling conflicting objectives Case Study –Sweden: Track access charges and the implementation of the SERA directive - promoting efficient use of railway infrastructure or not?, *Project Report, CERRE*, available at https://cerre.eu/publications/track-access-charges-reconciling-conflicting-objectives/.

At the end of the day, the level of track access charges shows a fundamental choice in railways policy: the distribution of costs between passengers and taxpayers. In all Member States, public funding represents a major contribution to railway infrastructure: on average, it represents 80 percent of the total funding of for infrastructure in the European Union.[41] In those countries where passengers take a more relevant share of the cost of the system in the form of payment for transport services, a larger part of these payments is transferred to Infrastructure Managers in the form of track access charges. Infrastructure Managers will have a more reduced dependency on public subsidies.

In the countries where the taxpayer takes a higher share of the costs of the system, two solutions can be implemented. Firstly, public authorities can directly subsidise the Infrastructure Manager, thereby reducing its reliance on track access charges. Secondly, public authorities can largely subsidise Railway Undertakings with compensations for Public Service Obligations, in such a way that Railway Undertakings can then pay high access charges. In this way, Infrastructure Managers are indirectly subsidised.

On average, public subsidies represent half of the total costs of Infrastructure Managers in the EU, but there are very relevant divergences across Member States. In some cases, public subsidies cover most of the cost, whereas in others they barely cover 50 percent of it.

Figure 14. Relevance of public grants in Infrastructure Manager funding



Source: IRG-Rail (2019): Benchmark on Financing of Main Railway Infrastructure Managers in Selected European Countries, position paper 19(9), November 2019, p. 9, Gross for total costs, Net for total costs minus grants and other revenue.

The different models can be stable provided that lower revenue from one source (i.e., public subsidies) is compensated by higher revenue from another source (i.e., track access charges). Other instruments can be used to compensate side effects, such as higher PSO compensations to cover high track access charges.

However, divergences can have negative effects, particularly for the provision of international services. The calculation of track access charges across jurisdictions is inherently a complex exercise. This is because the balance, which is usually present inside a single country disappears when different countries are involved. For instance, high track access charges in a certain part of the route might not

[41] Commission Staff Working Document Accompanying the document Seventh monitoring report on the development of the rail market under Article 15(4) of Directive 2012/34/EU of the European Parliament and of the Council, SWD/2021/1 final, 13.1.2021.

be compensated through higher PSO compensations, making the service non-viable. This affects passenger services, with high divergence in track access charges, more than freight services, which tend to have lower track access charges, at least in Western Europe.

3.2.2. Balanced accounts

Beyond divergences in track access charges, PSO compensations and the proportion of the total costs of the system that are borne by passengers and the tax payer, the Recast Directive imposes an overall obligation on Member States to balance the accounts of Infrastructure Managers.

Member States have the obligation to ensure that infrastructure expenditure is balanced with the necessary revenue, at least over a period of 5 years (Art. 8(4) Recast Directive). Having said that, it has not been common in the past to enforce this obligation, as illustrated by the fact that Infrastructure Managers in some Member States have grown large debts due to scarce public funding.

The Recast Directive imposes some formal safeguards to rule the relationship between States and Infrastructure Managers. Firstly, Member States are obliged to produce an indicative rail infrastructure development strategy to cover at least five years (Art. 8(1)). Taking into account such strategy, the competent national authority will conclude a contractual agreement with the national Infrastructure Managers, which will provide visibility about future costs derived from renewals and the development of new infrastructure and future payments and funds (Art. 30 and Annex V). The Infrastructure Manager will adopt a business plan including investment and financial programmes. The plan shall be designed to ensure optimal and efficient use, provision and development of the infrastructure while ensuring financial balance and providing means for these objectives to be achieved (Art. 8(3)).

While the formalities in Art. 8 of the Recast Directive have been mostly met by the Member States and the Infrastructure Managers, the overall objective to ensure a balance of accounts over a period of five years has not always been met. Some Member States have not provided enough funding in particular for the renewal and the development of new infrastructure, which is sometimes borne by Infrastructure Managers.

Actually, the EU regulatory framework presents an institutional loophole in the relationship with the funding of the system. While national Regulatory Bodies have the power to intervene on the level of track access charges and tend to promote reductions to foster usage intensity and market entry, they are not competent to supervise the financial implications of their decision. They usually have no competence to guarantee the balance of accounts, and certainly cannot impose on the national government the obligation to compensate reductions in track access charges with increases in public subsidies for the Infrastructure Managers.

Insufficient public funding puts pressure on the system. On the one hand, Infrastructure Managers might receive insufficient funding to cover the total cost of the infrastructure in such a way that even high access charges are not sufficient to cover the costs. On the other hand, Railway Undertakings might not receive sufficient compensation (or even no compensation at all) for Public Service Obligations.

When public finding is insufficient, Infrastructure Managers and Railway Undertakings are forced to rely on debt to cover the difference between costs and revenue. Member States can cover the debt accumulated by the Infrastructure Manager over time, as they are monopolistic providers, and such funding does not distort competition. However, due to EU State aid legislation, the debt accumulated by Railway Undertakings cannot, in principle, be covered by States.

3.3. Service facilities

The Recast Directive regulates prices for service facilities. Common rules on pricing are imposed on all the Member States. However, significant divergences persist in terms of charging principles and the resulting prices.

On the one hand, prices cannot exceed the cost of the provision of the service plus a reasonable profit for service facilities in point 2 of Annex II of the Recast Directive (Art. 31(7)). It includes services that can hardly be replicated, such as passenger stations, freight terminals and storage sidings, but also maintenance facilities.

Reasonable profit is defined as "a rate of return on own capital that takes account of the risk, including that to revenue, or the absence of such risk, incurred by the operator of the service facility and is in line with the average rate for the sector concerned in recent years" (Art. 3(17) Recast Directive).

On the other hand, no price regulation is imposed on additional and ancillary services, as listed in Annex II of the Recast Directive, when there is more than one provider of such services. If there is only one provider, prices cannot exceed the cost of the provision of the service plus a reasonable profit (Art. 31(8) Recast Directive).

For service facilities, regulation allows to recover the full cost of the provision of the service plus a reasonable profit. However, this is a possibility and not an obligation. The threshold defined by the Recast Regulation is a maximum price, not a minimum price. In some Member States subsidies are granted to the operation of service facilities, which results in prices lower than the actual cost.

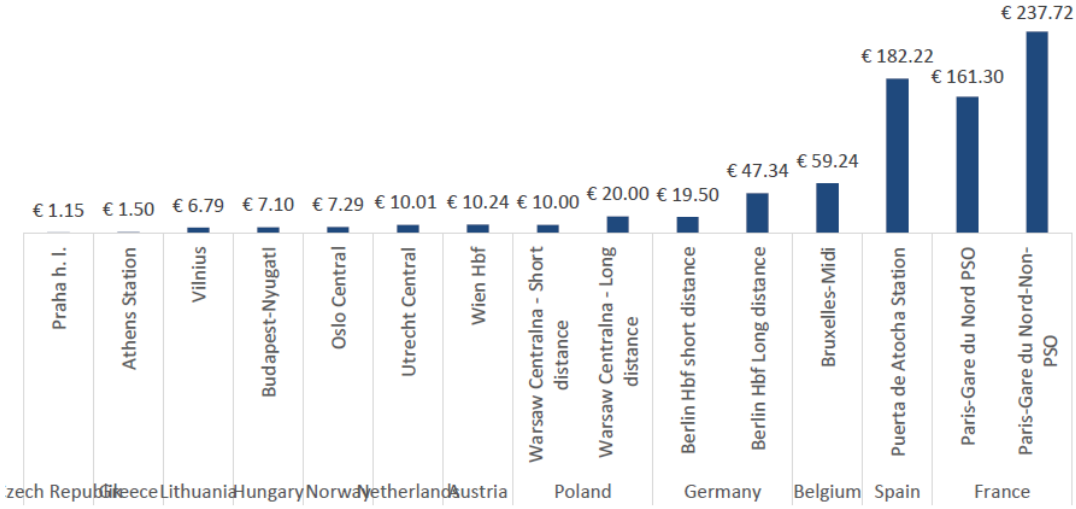
However, despite the application of a common rule for the definition of regulated prices in service facilities, there is a wide divergence in pricing principles, and therefore in prices, across Member States.

There are different ways to calculate the cost of the provision of a service: "There are two main ways of determining the cost of providing a service i.e., the bottom-up engineering approach and the cost accounting approach. In any case, in order to determine the cost of providing a service, one must be able to tease out which of the service providers' costs are to be allowed to count towards this cost".[42] As regulatory experience in other network industries shows, divergence can derive from the use of historic costs or forward-looking costs. Along these lines, there are different ways to calculate the reasonable profit. While the weighted average cost of capital (WACC) tends to be increasingly popular, some Member States keep using comparisons, setting fixed rates of profit, or simply ignoring profit. No effort can be identified to harmonise costing methodologies and prices, either by the definition of guidelines from the Commission or from cooperation by Regulatory Bodies.

For passenger stations, the following divergences can be identified: 1) In a small number of countries prices are not set according to the rule in the Directive, with the "reasonable profit" being an issue; 2) Charging units are different: per stop, per departure, lump sum or other; 3) Charging criteria are different: type of station, number of passengers, type of train; length of platforms, type of service (PSO, long-distance, etc.), as identified by IRG-Rail.[43] Due to the relevant divergences in pricing policies, the resulting prices are extremely divergent:

[42] IRG-Rail (2019): *"On the charging principle of Article 31 (7) of Directive 2012/34/EU 25"*, November 2019, p. 4.
[43] IRG-Rail (2019): *"An overview of charges and charging principles for passenger stations"*, November 2019.

Figure 15. Comparison of charges for selected station

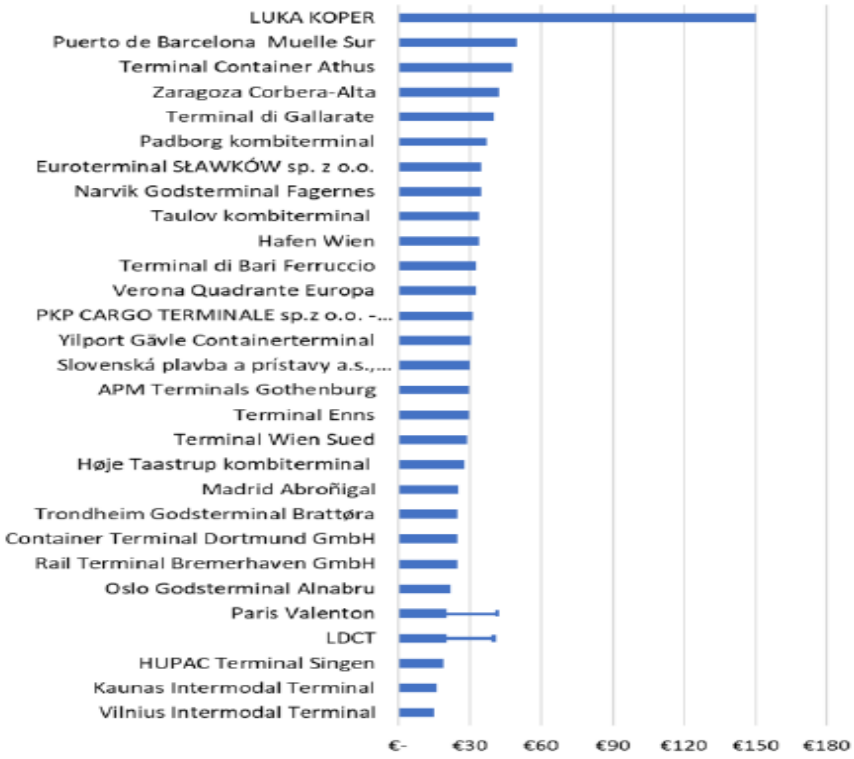


Source: IRG-Rail (2019): "An overview of charges and charging principles for passenger stations", p. 23.

As for track access charges, the observed divergence in specific prices is illustrative of the different approaches to fund infrastructure. Stations can be mostly funded with price charges for their services, or complemented with subsidies and other revenue (commercial activities, etc.).

For freight terminals, divergences can also be observed. Even in the handling of containers, considered as the most harmonised services in freight terminals, there are divergences in: 1) the charging units: per container, per tone, per number of handling of operations, etc.; 2) The allocation of common costs, fixed costs and variable costs; 3) the modulation charges; and 4) the way the reasonable profit is calculated.[44] The resulting prices tend to diverge, but not as much as for passenger stations:

Figure 16. Charge comparisons among selected terminals



Source: IRG-Rail (2020): "Overview of charges and charging principles for freight terminals", p. 26.

[44] IRG-Rail (2020): *"Overview of charges and charging principles for freight terminals"*, November 2020.

As a conclusion, prices for service facilities largely diverge across the European Union, revealing not only differences in underlying services due to multiple reasons (geography, quality of services, etc.) but also underlying differences in how the whole system is funded.

3.4. Investment in new capacity. Is the current framework ready?

The current regulatory framework is mostly focused on facilitating access to existing assets to Railway Undertakings, particularly to newcomers. Special procedures are designed to grant access to tracks and service facilities. Rate regulation is defined with the objective of limiting the maximum access price: for rail infrastructure, mark-ups to direct costs are restricted, assuming that track access charges will usually not cover the total cost of the infrastructure, and for service facilities, charges are limited to cover costs plus a regulated reasonable profit. Non-discrimination is the overarching principle on access to any kind of asset. National Regulatory Bodies have the primary role to regulate access conditions.

It is a well-known fact that it is easier to regulate access to existing infrastructure developed under monopoly rights, than to provide the right incentives to promote the development of new infrastructure (or expensive investment in infrastrucutre maintenance and upgrades) and subsequently regulate non-discriminatory access to it. The transition in telecommunications from copper telephone infrastructure to fiber is an illustrative example of how the original regulatory framework designed for liberalisation had to be adapted to a new period of infrastructure development.

The European Green Deal imposes ambitious objectives on transport, and in particular on growth in rail transport, both passenger and freight services. Such objectives can only be met with an equally ambitious growth in the capacity of rail infrastructure. This growth, in turn, can only be accommodated through substantial investment both in rail infrastructure and service facilities.

The railway industry is different from telecommunications, as many assets are managed as a natural monopoly, relying mostly on public subsidies. Notwithstanding, the development of new infrastructure will require an increase in public subsidies. It will be necessary to develop more high-speed lines, to expand capacity at stations, and to ameliorate infrastructure for freight services, among others. This poses a challenge on top of the existing obligation on Member States to guarantee the balance between income and expenditure for Infrastructure Managers. The current institutional framework is not focused on the enforcement of this obligation.

Furthermore, there are service facilities, both assets and services, which may represent only a small fraction in terms of costs, but can rapidly become bottlenecks for the growth of the system. As already pointed out, there is a common regulatory framework for a category that is founded on very heterogenous elements, which in turn, poses a challenge when analysing the incentives in the current regulatory framework for investment in new capacity. It is not always clear who should be assuming the cost of new service facilities (i.e., the Infrastructure Manager or Railway Undertaking) and even more relevant, the current framework might disincentivise investment in assets and services provided under competition (or at least potentially competitive).

3.4.1. Investment in the Development of Rail Infrastructure

The Recast Directive differentiates between the development of the railway infrastructure, and the maintenance, renewal and upgrade of infrastructure. The development of new infrastructure means network planning, financial and investment planning as well as the building and upgrading of the infrastructure (Art. 3(2a) Recast Directive). The upgrade of infrastructure means major modification works to the infrastructure which improve its overall performance (Art 3(2e)), while renewal means

major substitution works on the existing infrastructure which do not change its overall performance (Art. 3(2d)) and maintenance means works intended to maintain the condition and capability of existing infrastructure (Art. 3(2c).

It is the responsibility of Member States, and not Infrastructure Managers, to determine the development of rail infrastructure within the framework of its general policy on development and financing of infrastructure, which includes the construction of new infrastructure and the upgrades of existing infrastructure (Art. 3(2) Recast Directive). While Infrastructure Managers are responsible for maintenance and renewal of existing infrastructure, their role in the development of infrastructure is limited. Infrastructure Managers have to participate in the decision-making on the development of infrastructure as determined by Member States, and are then entrusted with it.

Member States are responsible for the development of their national railway infrastructure, and to this end, they are obliged to publish an indicative rail infrastructure development strategy (Art. 8 (1) Recast Directive). The strategy should cover a period of at least five years.

The indicative rail infrastructure development strategy is the result of a consultation with all the interested parties. Certainly, Infrastructure Managers have an important role to play, as they are the entities with the best knowledge of the conditions of the rail infrastructure in each Member State. Railway Undertakings also have a role to play in the development of rail infrastructure, as they possess better visibility of demand, and can communicate that information to the authorities. Shippers and passenger groups can also participate in the consultation.

The indicative rail infrastructure development strategy has to be based on a sustainable financing of the railway system. Member States shall ensure that, under normal business conditions and over a reasonable period which shall not exceed five years, the profit and loss account of an Infrastructure Manager at least balance income from infrastructure charges, surpluses from other commercial activities, non-refundable income from private sources and State funding, including advance payments from the State, where appropriate, on the one hand, and infrastructure expenditure, on the other hand.

A contractual agreement is signed between the competent public authorities in each Member State and national Infrastructure Managers. The contractual agreement transfers the content of the planning in the indicative rail infrastructure development strategy in the form of contractual obligations for the Infrastructure Manager, to be funded according to the financial commitments by the public authorities described in the contractual agreement. Based on the conditions in the contractual agreement, Infrastructure Managers produce their business plans.

The current regulatory framework contains provisions on the financing of rail infrastructure development. There are horizontal rules on State aid, in order to avoid the distortion of competition, as well as sector-specific rules to ensure the necessary funding for the development of rail infrastructure.

Since “railway infrastructure is a natural monopoly” (recital 71 Recast Directive), there is a reduced risk of public grants distorting competition and coming into conflict with the TFEU rules on State aid. The Community guidelines on State aid for Railway Undertakings[45] (currently under review) state that where infrastructure use is open to all potential users in a fair and non-discriminatory manner, and access to that infrastructure is charged for at a rate in accordance with Community legislation the Commission normally considers that public financing of the infrastructure does not constitute State aid to Railway Undertakings. Problems might arise when infrastructure generates a selective advantage for a Railway Undertaking, lightening the burden of charges normally encumbering Railway Undertakings' budgets.

[45] Communication from the Commission — *Community guidelines on State aid for railway undertakings* (2008/C 184/07), Document 52008XC0722(04)

Actually, it is more common for public funds to be insufficient to cover the Infrastructure Manager's expenditure. Member States are obliged to provide the Infrastructure Manager with financing consistent with its functions, "in particular in order to cover new investments" (Art. 8(2) Recast Directive). Even if financing sources other than direct State funding are possible, such public grants are the most common source of funding for Infrastructure Managers. According to recent data, public grants cover around 50 percent of Infrastructure Managers' expenditure in the EU,[46] even if there are very significant divergences between Member States. In some Member States, public grants cover around 80 percent of the total expenditure, while in others they barely reach 40 percent of the total expenditure.

It can be identified that countries with the largest high-speed networks, in particular France and Spain, present the lowest coverage of total expenditure with public grants. Instead, they rely more heavily on track access charges to cover their expenses, which, in turn, tends to make such charges higher than in other Member States. This is feasible under the current regulatory framework, as high-speed passenger services tend to be more competitive against other transport modes, which means that mark-ups can be added to direct costs without being an obstacle to the competitiveness of the service.

However, it can be observed that Infrastructure Managers with the largest high-speed networks present the largest debts. The State has not fully funded the development of the infrastructure, which instead has been funded by the Infrastructure Managers relying on the markets for the financing of the development.

Even if the Recast Directive obliges Member States to ensure a balanced profit and loss account for Infrastructure Managers (Art. 8 Recast Directive), this is not always the case, particularly when Infrastructure Managers are required to develop new infrastructure.

The pursuit of the European Union's modal shift objectives will require major investment in rail infrastructure to increase capacity. These investments should be rightly prioritised in the national indicative rail infrastructure development strategies, and proper funding mechanisms should be included in the national contractual agreements, to meet the financial balance obligation.

National Regulatory Bodies tend to focus their attention on the enforcement of rules on track access charges. Their tendency is to ensure such charges are not an obstacle to competition (mostly through discrimination) and more broadly, to keep charges as low as possible, particularly when Infrastructure Managers seek to introduce mark-ups beyond direct costs. The actual competences on access charges of the different national Regulatory Bodies might vary across the Union. However, even when such competences are rather limited, the advisory positions published by the Regulatory Bodies tend to be focused on reducing track access charges.

On the contrary, accounting balance tends to be beyond the interest or even competences of Regulatory Bodies. Regulatory Bodies tend to focus exclusively on one financial element (access charges), while giving little consideration to other financial instruments, which should ensure sufficient income, in particular public grants. In fact, the Recast Directive does not even impose on Member States the obligation to ensure Regulatory Bodies have the power to review the financial balance angle in the contractual agreement. Article 56(4) in the Recast Directive merely foresees that Member States may decide that the regulatory body is assigned the task to adopt non-binding opinions on the provisional versions of the contractual agreement and the business plan.

As major construction works will be necessary to meet decarbonisation targets, and such works will require the necessary funding, it is important to ensure that the financial balance obligation is properly enforced.

[46] IRG-Rail (2019): *Benchmark on Financing of Main Railway Infrastructure Managers in Selected European Countries, p. 9*.

3.4.2. Investment in Service Facilities

The category of service facilities and rail-related services is overly broad, covering assets and services which are very different. Furthermore, service facilities can be operated by different players, including Infrastructure Managers, incumbent Railway Undertakings, newcomers Railway Undertakings and third parties. It is therefore impossible to analyse investment in service facilities as a single issue. On the contrary, different challenges will be faced by different facilities and different operators.

On the one hand, a number of service facilities can be considered as natural monopolies, and their operation is not very different from the management and investment in rail infrastructure. This is the case of passenger stations, where we see limited scope for competition in the services they provide.

On the other hand, some service facilities and rail-related services are not natural monopolies, and can be provided in competition by different operators, or a least there is room for potential competition under certain circumstances. This is the case, for instance, of maintenance services. The Recast Directives partially acknowledges this fact by classifying heavy maintenance facilities dedicated to high-speed trains as ancillary service facilities (and therefore under lighter regulatory access and pricing obligations), and not as basic service facilities, as the rest of maintenance facilities.

The Recast Directive reduces regulatory obligations for additional and ancillary service facilities, particularly when there is more than one provider, which as a consequence triggers the lifting of pricing regulations.

However, the long list of basic service facilities includes facilities and rail-related services that can also be provided in competition, or at least, are potentially competitive. In these cases, the regulatory framework imposes the same obligations independently of this fact. This has important implications for incentives to investment in new service facilities.

The current regulatory framework includes an exceptional provision allowing third parties as newcomers to resume the exploitation of unused service facilities. This is an efficient means to incentivise investment into new capacity, making better use of service facilities that exist but are not used.

There is a number of service facilities that were developed sometimes decades ago, when the industry was different, and that are not in use at the present. This is usually the case of maintenance facilities and freight terminals. Given that these unused facilities tend to be close to tracks and sometimes in the proximity of stations and freight terminals makes them an important asset. Another factor which renders them particularly important is the fact that newcomers do not necessarily enjoy easy access to land in these areas to develop new facilities from scratch.

Implementing Regulation 2017/2177 defines a detailed process for unused basic service facilities to be leased by owners to other interested parties. In particular, the Implementing Regulation clarifies the basis on which 1) an owner of an unused service facility is obliged to publicise the availability of such unused service facility for lease or rent; and 2) a service facility operator may object to such publication prior to it being made where a ‘reconversion’ process has been launched before any expression of interest was made. Reconversion refers to the formal process by which the purpose of the service facility is changed to a use other than for the supply of rail-related services.

It starts with the obligation imposed on a service facility operator to disclose that it has not been used for more than two years. It is not always straightforward to identify this fact, as a single facility might have different operators, each of them managing a different element (i.e., the land, the equipment, services over the land and equipment, etc.). It might also be the case that a large facility has different uses, with one being active but not others.

Following the disclosure of an unused service facility as such, an interested applicant can express interest in writing to the operator of the facility concerned and inform the regulatory body thereof. Such an expression of interest shall demonstrate the needs of the Railway Undertaking concerned. The operator of the service facility may decide to resume operations in a way that satisfies the Railway Undertaking's demonstrated needs.

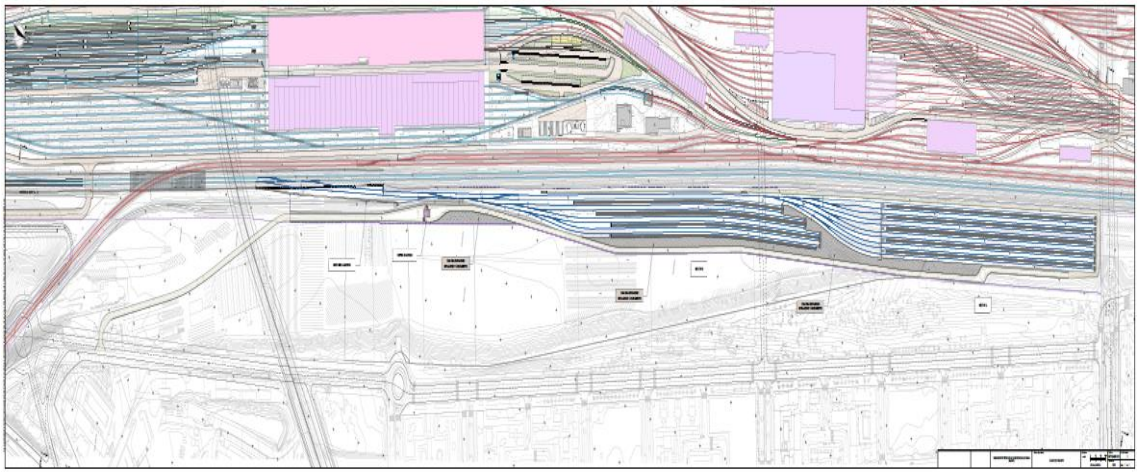
Where the owner of a service facility does not operate that facility, the operator of that facility shall inform the owner about the expression of interest within 10 days following its receipt. The owner of the facility shall publicise that the facility is available for lease or rent, as a whole or in part, unless the operator of the service facility has decided to resume operations after the expression of interest. The operator may object to that publication by submitting documents proving that there is an ongoing process of reconversion, launched before the expression of interest. The regulatory body shall be informed by the owner about the reconversion process and may request documents from the operator in order to assess its plausibility. If the assessment is unsatisfactory the regulatory body shall require the publication of the operation of the facility as being for lease or rent, as a whole or in part. Despite these provisions, confusion on the part of Infrastructure Managers persists as regards what truly constitutes a ‘reconversion’ process. This in turn highlights the need for further clarifications to the definition.

An expansion in services will often require a capacity expansion in service facilities and rail-related services. This is particularly the case as newcomers enter the market. However, it is not always obvious who should be investing in new capacity in service facilities. As explained above, service facilities are managed across the Union, and even within a single Member State, by distinct types of entities, with different incentives.

Current service facility operators might not have the interest or the incentive to expand capacity. They might not always be in the best position to decide on this new investment, as they have limited visibility on Railway Undertakings’ business plans, particularly newcomers. In contrast, newcomers, both Railway Undertakings and service facility operators, are well positioned to decide, and take risks, based on their business plans.

An active Infrastructure Manager will take the lead to invest in new service facilities if the need to do so is identified. One example is when investment improves the operation of rail infrastructure, as is the case, for instance, of certain storage sidings near busy stations. ADIF’s investment on new high-speed lanes storage sidings in Chamartin Station in Madrid has been one illustrative example:

Figure 17. New high-speed lanes storage sidings in Chamartin Station in Madrid



Source: Image produced by ADIF for the UIC Working Group.

However, such investment should only be imposed if there is no viable alternative, for instance, parking on tracks in the station, a practice that has been observed in certain Member States such Italy and Spain.

Second, investment in service facilities such as storage sidings for parking, cleaning and maintenance can be undertaken by an active Infrastructure Manager when there are objective barriers for newcomers to invest, such as the scarcity of land, or short PSO contracts making it unviable to make long-term investments in this type of facilities.

On the contrary, as a general rule, it seems reasonable to leave new investment in service facilities to Railway Undertakings and service facility operators. As the entities possessing a clear understanding of their operational needs as well as their business plans, they are best placed to take the risk of the new investment.

Infrastructure Managers could facilitate investment by making the assets at their disposal, for instance, land near tracks and stations, available by leasing or selling them for the construction of new service facilities.

Access regulation has to strike the right balance between facilitating access to existing infrastructure and promoting investment in new infrastructure. In the early phases of reform, it is common to focus attention on facilitating market entry to newcomers by making access to infrastructure as simple, fast and affordable as possible. However, in the long term, it is important to take into consideration the incentives for investment in maintenance, renewals, upgrades and even the development of new infrastructure, perhaps with new technologies.

This trade-off is relevant in service facilities, as very often they are managed under commercial principles, sometimes even in competition, particularly as more newcomers enter the market. This is the case for maintenance facilities and services, in particular.

If a substantial increase in services is expected to meet the European Green Deal objectives, investment into enhancing capacity in service facilities such as maintenance facilities and services is necessary. Newcomers, both Railway Undertakings and service facility operators, will have to invest to increase the existing capacity, as well as incumbents needing to meet new demand.

However, the current pricing regulation does not always incentivise investment in new facilities. All basic service facilities are under price regulation, independently of whether there is room for competition or even actual competition in the market. There is a price limit, which is defined as the addition of total costs plus a reasonable profit.

Most Regulatory Bodies have been focused on facilitating market entry, so they have pushed for price reductions, for instance by defining costs according to historic costs. In an industry where assets were deployed a long time ago, and depreciation is important, regulated prices might be significantly below market prices, as well as below the cost of constructing a new facility.

Under these circumstances, there is a disincentive to invest in new facilities, both for incumbents and newcomers, as they have to compete with the low prices of the existing facilities.

Drawing on the experience of telecommunications, and as the rail industry is facing a new period of growth in investment and demand, Regulatory Bodies might have to seek a new balance between the conflicting objectives of facilitating access to existing infrastructure, and incentivising investment in new infrastructure.

3.5. Conclusions

Despite the rules defined in the Recast Directive, there are significant divergences in the charging principles and the actual charges set in the different Member States for access to rail infrastructure and service facilities.

Divergences in track access and service facility charges reveal underlying divergences across fundamental issues on the financing of the sector. Some Member States grant more public subsidies to rail infrastructure and therefore, they enable lower track access charges and lower prices for passengers and shippers. The same applies to some service facilities such as stations.

Competition poses new challenges to the current economic framework. Infrastructure Managers can consider more commercial approaches, common in aviation and other network industries, and offer discounts to attract traffic, both in the form of volume discounts and new services discounts, sometimes with distortive effects. Competition in commercial services usually leads to requests to reduce track access charges as well as charges by service facilities, as a form to reduce barriers to market entry.

In any case, there is room for harmonisation in the principles for setting charges, as a form to simplify cross-border services and reinforce the single European railway area. An example is the Commission Implementing Regulation (EU) 2015/909, on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service.[47] National Regulatory Bodies could also promote harmonisation in their practices in the framework of IRG-Rail.

Finally, when regulating prices, it is important to balance the interest to reduce barriers to entry against the interest to promote the development of the network. This is particularly relevant at this very moment, where the European Green Deal necessitates a substantial increase in the capacity for rail passenger and freight transport. If public funds are not available to fully fund the renewal and development of infrastructure, charges for the use of the service would be necessary.

[47] Commission Implementing Regulation (EU) 2015/909 of 12 June 2015 on the modalities for the calculation of the cost that is directly incurred as a result of operating the train service.

4. Conclusions: regulatory challenges in the rail sector

The EU regulatory framework for the railways sector has reached maturity, as the Fourth Railway Package was adopted in 2016 and has now been implemented by the Member States. It is a good moment to evaluate how well it is prepared to cope with emerging competition, and whether it is ready to support the shift to rail derived from the European Green Deal.

Competition, particularly in passenger services, was one of the leading objectives of the reform, and as it is emerging in some of the Member States, but not in others, it is of interest to identify the challenges that competition poses to the regulatory framework, and whether it was properly designed to cope with effective competition.

First, it has been identified that the existing regulatory instruments have to be reinforced to foster cross-border services. These services offer the most obvious opportunities for growth and modal shift. A series of initiatives are underway to reinforce cooperation among Infrastructure Managers, and a closer collaboration with the rest of the industry: Railway Undertakings and Service Facility Operators.

Second, the management of capacity both in rail infrastructure and in service facilities poses challenges due to divergences in the implementation of the EU legislation. Furthermore, scarce capacity in rail infrastructure as well as in stations and other service facilities is a barrier to entry for which the EU regulatory framework does not provide a clear response.

Innovative solutions in the form of a more active infrastructure management are emerging to face these two challenges. There is more pre-planning of the use of infrastructure: international and national track paths, even the creation of pre-arranged paths by the Infrastructure Managers, more pre-planning of reactions to congestion in rail infrastructure, of Temporary Capacity Restrictions, of capacity in stations, and so on. These solutions take different forms, but they share a leading role for Infrastructure Managers, under the supervision of the Regulatory Bodies, in close communication with Railway Undertakings and Service Facility Operators.

Furthermore, the Green Deal poses a fundamental challenge to the current regulatory framework. Modal shift requires the maximum efficiency in the use of the existing capacity, but certainly also the development of new rail infrastructure and extra capacity in service facilities to cope with the new traffic. The current regulatory framework was designed to guarantee non-discriminatory access to infrastructure at the best possible conditions, also in terms of pricing. Experience in other regulated industries such as telecommunications shows that when further investment becomes a priority, some principles and rules might have to be reconsidered in order to provide incentives for investment to increase capacity.

4.1. Overcoming fragmentation to build a competitive European rail network

European railways have been under reform over the last 30 years to build the Single European Railway Area. Reform has been led by the European institutions, with the scope to overcome fragmentation and evolve from national rail systems to a European rail system. Competition has been gradually introduced as an instrument to support integration, but at the same time, it has created new forms of fragmentation.

Starting in the late 1980s, the European institutions started a process of reform to reinforce the single market. Railways, as the rest of infrastructure-based industries, had evolved from fragmented infrastructures in the origins of the industry in the 19th century, into integrated national monopolies.[48] The objective was to evolve from national monopolies to a competitive Single European Railway Area. Railways followed behind the reform of other network industries such as telecommunications, energy and other transport modes as aviation.

Railway infrastructure is mostly a natural monopoly. It requires massive resources not only to develop new infrastructure, but also to maintain it. Furthermore, infrastructure evolved in every Member State according to its own standards (signaling, electrification, even track gauges), which was not the case of industries such as telecommunications and aviation, where international standards prevailed. Interoperability across national rail infrastructure is not simple either. It is not a mere matter of working on infrastructure at the connecting points on borders, but also about ensuring that trains are able to run across the entire infrastructure. Full interoperability is a long-term objective, which requires to invest now, to reap the benefits of an integrated system in the future.

Overcoming geographical fragmentation in the European Union required to vertically fragmentate the national monopolies. Vertical separation of activities between the management of the infrastructure, the provision of rail transport services and the operation of service facilities was required in the successive legislative packages. Resistance to such separation has resulted in divergent models: in some Member States there is full separation between the Infrastructure Manager and the incumber Railway Undertaking. In others, different entities were formed but integrated into a holding.

Service facilities such as passenger stations, freight terminals, maintenance facilities and a long list of auxiliary services (including traction current, telecommunications, etc.) can be operated by the Infrastructure Manager, the incumbent Railway Undertaking or third parties, based on the distinctive strategies implemented in each Member State.

Competition in the provision of rail transport services has created further fragmentation. Instead of a single entity providing rail transport services in each Member State, competition has allowed unrestricted market entry for the provision of freight services and commercial passenger services, and tenders for the provision of services under Public Service Obligations (PSO). Market entry has been slow. It is more mature in the provision of freight services, and in its infancy in most Member States in the provision of passenger services, but there are some pioneers: Italy, Sweden, Czechia and Spain.

Regulation was introduced to govern the relationship between Infrastructure Managers, Service Facility Operators and a growing number of Railway Undertakings. Directive 2012/34/UE[49] (the "Recast Directive") defines the principles according to which Railway Undertakings are to be granted access to infrastructure, non-discrimination being the most relevant. The Recast Directive defines detailed procedures for the allocation of track paths and the pricing of such capacity. The Recast Directive also lays down rules on the relationship between Railway Undertakings and Service Facility Operators. National Regulatory Bodies in all Member States are empowered to supervise access to rail infrastructure and auxiliary services by Railway Undertakings.

The implementation of the EU regulatory framework has resulted in common institutions and procedures across Member States, but at the same time into very divergent results in substantive terms. Member States have enforced the procedures to guarantee access to track paths and Service

[48] Juan Montero, Matthias Finger (2020): "Railway regulation: a comparative analysis of a divergent reality", *Handbook on Railway Regulation. Concepts and practice*, Edward Elgar, Cheltenham, UK. pp. 1-20.
[49] Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (the Recast Directive), Document 32012L0034.

Facilities: network statements are published with the available infrastructure and services, capacity allocation procedures have been implemented, and pricing rules have been defined according to the Recast Directive. National Regulatory Bodies have been created and they supervise such procedures.

However, in substantive terms, the access conditions are very different across Member States. The most obvious example is the extremely divergent pricing for access to track paths, stations, freight terminals, etc. Other divergences can be identified, for instance on the priorities for the allocation of train paths, the management of Temporary Capacity Restrictions, and so on. This report identifies a long list of divergences.

Obviously, a large part of the divergence is the result of underlying differences in the national rail systems. There are national rail systems with a very high density of services (Netherlands, Belgium, Germany) and other systems with a lower density (Spain, Romania, Greece), due to historical reasons but also to geography. There are systems where passenger services dominate (Western Europe) and systems where freight is very relevant (mostly Eastern Europe). The status of infrastructure is very different. For instance, some Member States have heavily invested in high-speed infrastructure. Financing is also very different across the European Union. Some Member States largely subsidise railways, while other keep public funds shorter. Even when public funds are abundant, they can be channeled differently: they can be used to finance the Infrastructure Manager, or they can be used mostly to finance Railway Undertakings in the form of Public Service Obligations compensations.

Nonetheless, part of the divergence can be merely attributed to the uncoordinated implementation of the EU framework. The EU Directives left a lot of space for Member States to implement the regulatory framework in their own form. Compromise often required to leave loopholes in the EU legislation. An important example here is the absence of rules in the Recast Directive on prioritisation in case of congestion in the infrastructure, and more stringent rules on access pricing.

Competition, particularly in passenger services, is posing pressure on the system, exposing the loopholes and the missing legal certainty in certain points of the existing regulatory framework. Newcomers are pushing to enter the market putting the regulatory framework to the test. Similarly, regulatory measures designed to increase contestability by reducing barriers to entry are put to the test. Access to infrastructure and service facilities is a barrier to entry. The regulatory solutions in the EU framework are being proved as necessary, but sometimes as insufficient. The report shows the main cases where regulation is insufficient. Special attention has been devoted to three issues,: 1) access to track capacity, and in particular in case of congestion; 2) access to service facilities; 3) the economic framework, particularly track access charges and new investment.

4.2. Cross-border services

It is perfectly identified at this stage that fragmentation is damaging the potential of railways in Europe. The provision of cross-border services, both passenger and freight services, is hampered by the management at national or even sub-national level of access to infrastructure and the lack of proper coordination among Infrastructure Managers.

The existing regulatory framework has not modified the fact that rail infrastructure is managed at a national level. Rail infrastructure is mostly managed by State-owned monopolies. They are governed by national legislation, even if it is an implementation of the EU Directives. Capacity allocation procedures are run by Infrastructure Managers at a national level. Supervision is entrusted to Regulatory Bodies.

A cross-border transport service requires the allocation of capacity by each Infrastructure Manager according to national rules, national procedures, conditions defined at a national level, subject to Temporary Capacity Restrictions defined at a national level. This is widely recognised as a barrier for the efficient provision of cross-border rail services.

The current EU regulatory framework defines various coordination instruments. As an example, the Recast Directive imposes the creation of the European Network of Infrastructure Managers (Art. 7F); Network Statements must state the principles governing international coordination (Art. 46); the special needs of international services have to be taken into account in the coordination process (Art. 46(4)); Member States are invited to take into consideration international services in the definition of priority criteria (Art. 47); cooperation between Regulatory Bodies is foreseen (Art. 57), and so on. In an effort to reinforce cooperation, Regulation (EU) 913/2010[50] created Rail Freight Corridors (RFC).

A closer collaboration between Infrastructure Managers, in close contact with Railway Undertakings, is improving the situation. A good example is the more coordinated management of Temporary Capacity Constraints after the amendment of Annex VII of the Recast Directive, the elaboration of Guidelines by RailNetEurope, an association of Infrastructure Managers, and the production of specific IT tools to share information (see section II.4).

Another example is the joint effort to produce a coordinated timetable, prearranging paths across borders. This is an effort already featured in Article 40 of the Recast Directive, that is only materialising through the cooperation of Infrastructure Managers in RailNetEurope and Railway Undertakings in Forum Train Europe.

Finally, National Regulatory Bodies are also collaborating in the framework of the Independent Regulator's Group- Rail (IRG-Rail). Since its creation in 2011, it has taken an increasingly active role in exchanging information and sharing best practices. Along the Report IRG-Rail reports will be frequently quoted.

There is wide consensus that an extra effort is necessary to improve the conditions for the provision of cross-border services. Such an effort should build on the best practices built over the last years, and some bold advances.

4.3. Active infrastructure management

The EU regulatory framework is reducing geographic fragmentation across borders, but in parallel it has multiplied the number of players, and therefore it has created a new type of fragmentation. Infrastructure Managers and Railway Undertakings have been separated (in different degrees based on the Member States), the number of Railway Undertakings has multiplied as the different market segments have been liberalised. Service Facility Operators add to this complex ecosystem.

The EU regulatory framework relies on two instruments to coordinate the fragmented system. On the on hand, it relies on regulated procedures to grant Railway Undertakings access to rail infrastructure and service facilities. On the other hand, it relies on Regulatory Bodies to solve disputes and, in this way act as coordinator of the system.

Experience after the implementation of the Fourth Package, suggests with increasing clarity that the existing instruments for system coordination are insufficient. On the one hand, procedures to grant access to track capacity and service facilities have limitations. Firstly, they are poorly equipped to manage congestion. The definition of prioritisation criteria is one of the weakest points not only in the

[50] Regulation (EU) No 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight, Document 32010R0913.

Recast Directive but also in most national legislations. Secondly, the existing regulatory framework is poorly equipped to incentivise investment in new capacity (see next section). On the other hand, Regulatory Bodies have limited capability to improve operating efficiency.

A shift in paradigm can be identified in the role of Infrastructure Managers. During the implementation of the new regulatory framework, regulatory action was focused on guaranteeing the independence of Infrastructure Managers from Railway Undertakings and national governments, as well as on imposing access regulation on them, including effective powers for the Regulatory Bodies.

There are multiple signs of Infrastructure Managers adopting a more active role in the management of infrastructure. In general, across network industries, there is a trend for digital technologies empowering Infrastructure Managers to become more active in the management of capacity.[51] This is something that can be also identified in the rail industry, for instance in the Digital Capacity Management initiative launched in October 2021. International experience shows the same evolution, for instance in the reform of the rail sector in the United Kingdom, which has as one of its main lines of action a more active role for the Infrastructure Manager.[52]

In the European Union, Infrastructure Managers are expected to more actively manage capacity in different forms. There is a growing trend to pre-plan the use of capacity. This is the case with the Timetable Redesign (TTR) process, as well as in the pre-planning of Temporary Capacity Restrictions (TCRs).

Such a pre-planning can also be identified as a best practice at a national level, and it is not by chance that best practices can be identified precisely in the countries that have more competition in the market. Starting with the pioneer, Italy, some interesting measures can be identified: 1) In order to avoid congestion in the rail infrastructure, a process was enacted to allow the early identification of the infrastructure segments which are not congested but might be congested in the near future (segments that are classified as “segment with limited capacity”, so action can be initiated as early as possible to avoid congestion (see Section I.2); 2) the most sophisticated priority rules have been defined (see Section I.2); and 3) RFI has implemented “station utilisation plans” for the main stations. Instead of passively waiting for access requests, leading to conflict, a plan is adopted, as a way to pre-plan and optimise the available capacity (see Section II.2). ADIF has also implemented innovative policies to actively manage capacity in passenger stations (see Section II.2).

The best example of active infrastructure management in railways is the pre-arrangement of track paths by Infrastructure Manager (see Section II.3). This was an option proposed at an early stage of the liberalisation process in the United Kingdom. Article 40 of the Recast Directive already defined pre-arranged track paths as an instrument to facilitate capacity allocation for cross-border services, and it is at the heart of the effort of building a timetable for cross-border services.

At a national level, pre-arranged track paths are in place in France for services under Public Service Obligations. In the Network Statement, track paths at predefine intervals are reserved for the provider of such services. A more comprehensive exercise has been undertaken in Spain, where the Infrastructure Manager has optimised track paths so as to provide the maximum possible capacity in congested segments (the large passenger stations) and build three packages of pre-arranged track paths which were put out for tender. In this way, access to the market was facilitated to newcomers.

A more active Infrastructure Manager is in the position to act as system integrator in the rail system. It seems to be the party that is better positioned to coordinate the complex ecosystem created by the

[51] Juan Montero Matthias Finger, (2021): Digitalizing infrastructure: active managements for smarter networks”, *A Modern Guide to the Digitalization of Infrastructure*, Edward Elgar, Cheltenham. United Kingdom, pp. 1-42.
[52] William Shapps (2021): *Great British Railways*. The Williams-Shapps Plan for Rail, Presented to Parliament by the Secretary of State for Transport by Command of Her Majesty, May 2021.

EU regulatory framework. The initial period of consolidation of the new market structure, is giving rise to a new period in which a more active infrastructure management can overcome the coordination problems identified in the market, facilitating market entry, a more efficient use of the available capacity, and better coordination across borders.

Three checks and balances are emerging for such active Infrastructure Managers. First, a closer coordination of EU Infrastructure Managers is necessary to reinforce the interoperability of the national networks. The model of ENTSO-E, the European association of transmission system operators for electricity, provides a good model for a closer cooperation to reinforce the single European railway area. Secondly, a closer supervision by Regulatory Bodies seems necessary if a more active role of Infrastructure Managers is expected, and the cooperation of these bodies in IRG-Rail should be reinformed, following for instance the BEREC model in the telecommunications regulatory framework. Thirdly, such an active infrastructure management will only improve the system if it is undertaken in close collaboration with other stakeholder, responding to the needs of Railway Undertakings and Service Facility Operators.

4.4. Challenges posed by the need to expand capacity

Public authorities around Europe are increasingly prioritising rail transport over other transport modes as a response to climate change and the need to reduce emissions in transport. The transport sector will have to collectively reduce its emissions by 90 percent by 2050 as compared to 1990 levels if Europe is to be transformed into a climate neutral economy by mid-century in line with European Green Deal objectives[53]. The shift to rail from other transport modes such as road and aviation is a paramount policy objective given that railways have the lowest emissions per kilometer and unit transported in Europe and account for a mere 0.4 percent of the total EU transport sector greenhouse gas emissions[54]. As a result, railways are expected to grow substantially in volume across both the passenger and cargo segments. In particular, the European Commission's Sustainable and Smart Mobility Strategy foresees that by 2030 high-speed rail traffic will double whereas scheduled collective travel under 500 km should be carbon neutral within the EU. Subsequently, by 2050 rail freight traffic will double and high-speed rail traffic will triple[55].

Such a substantial growth poses the most fundamental challenge to the rail sector in Europe. The existing infrastructure will have to be exploited in the most efficient way to accommodate new demand. Substantial investment will be necessary to meet growth in passengers and freight. Capacity will need to increase with the development of new infrastructure, for instance high-speed infrastructure for passenger transport. Renewals will be necessary across the existing infrastructure. Stations will have to be enlarged. New service facilities will have to be built, such as new maintenance facilities for rolling stock, new intermodal terminals, as well as more capacity in ports, etc.

Such a fundamental challenge requires a well-functioning regulatory framework. The regulatory framework has to incentivise the efficient management of existing infrastructure, the efficient management of passenger and freight services while optimising the use of available capacity, the development of new infrastructure when necessary and, overall, the most responsive approach to the needs of passengers and shippers.

Competition has been introduced in the provision of both freight and passenger services, both open

[53] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions – *The European Green Deal*, COM(2019) 640 final.
[54] European Environment Agency (2021), *Rail and waterborne – best for low-carbon motorised transport*: https://www.eea.europa.eu/publications/rail-and-waterborne-transport.
[55] European Commission (2020), *Sustainable and Smart Mobility Strategy – putting European transport on track for the future*.

access competition for freight and commercial passenger services, and tenders for the exploitation of passenger services under public service obligations (PSO). Competition, both in the market and for the market, is expected to foster a more responsive approach by Railway Undertakings to the increasing demands from a growing number of passengers and shippers. However, competition is not a reality yet in large segments of the Single European Railway Area. Barriers to entry continue to be excessively high in some markets.

Capacity constraints in the rail infrastructure are among the more relevant barriers to competition. Tracks in some of the most attractive segments in Europe are congested, certainly around major metropolitan areas, and in the largest train stations. Congestion makes freight services unreliable, and new passenger services impossible in some routes (or very limited in scope).

Furthermore, capacity constraints have to be overcome in order to accommodate the substantial increase in passengers and cargo that is expected as a result of shift to rail policies. Existing capacity has to be managed as efficiently as possible, and investment in renewals and development of new infrastructure has to be incentivised. These are among the most relevant challenges railways are facing in Europe.

The adoption of the Fourth Railway Package by the European Union in 2016 had the ambition to prepare the sector for competition and, more generally, for the necessary growth to facilitate the decarbonisation of transport. More than five years later, it is important to take stock of progress made and evaluate the implementation of the Fourth Package. The scope of this report is to identify the challenges, loopholes and divergences in the interpretation of the existing framework, as well as to single out good practices, in order to support the smooth application of the existing framework and meet the challenges faced by the rail sector in Europe.

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