

# **9<sup>TH</sup> CONFERENCE ON COMPETITION AND OWNERSHIP IN LAND TRANSPORT**

## **REGULATION AND ADMINISTRATIVE PROVISIONS REGARDING ITALIAN RAILWAY**

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### **INTRODUCTION**

This paper concerns the charge systems in European countries.

In this field, there are two principal directives adopted by European Union: the directive 91/440/EEC and the directive 2001/14/EEC.

The Directive 91/440/EEC has the aim to increase the efficiency of railway transportation. To ensure a good management is proposed the separation of the management of railway operation and infrastructure from the provision of railway transport services.

This separation has determined the necessity of the introduction of charge for infrastructure use, charge that the railway undertakings have to pay.

The successive Directive 2001/14/EEC ensures transparency and non-discriminatory access to rail infrastructure for all railway undertakings and establishes that all the necessary information for access are to be published in a network statement.

Further, the different principles of fee will be analysed: the MC+ (Marginal Cost plus a mark-up) and FC- (Full Cost minus State compensation).

Then, will be describe the actual system of charge for infrastructure use in Italy, and will be presented a proposal of new system of charge.

## 1. THE OBJECTIVE OF THE EUROPEAN DIRECTIVES

The Directive 91/440/EEC has the aim to facilitate the adoption of the Community railways to the need of the Single Market and to increase their efficiency. So that the Directive provides the independence of railway undertakings to ensure a good management; the separation of the management of railway operation and infrastructure from the provision of railway transport services; the access to the networks of Member states for international groupings of railway undertakings and for railway undertakings engaged in the international combined transport of goods.

This Directive 91/440/EEC is applied to the management of railway infrastructure and to rail transport activities of the railway undertakings.

In general, Member States have to take the measures necessary to enable railway undertakings to adjust their activities to the market and to manage those activities under the responsibility of their management bodies, in the interests of providing efficient and appropriate services at the lowest possible cost for the quality of service required. All the railway undertakings must be managed according to the principles which are applied to commercial companies.

For the use of the railway infrastructure, national operators and international groupings, have to pay a fee to the manager of the infrastructure. The directive require to the Member States to lay down the rules for determining this fee.

Unique rule provided by directive about this fee is that the fee has to be calculated in such a way as to avoid any discrimination between railway undertakings, and must take into account the mileage, the composition of the train and any specific requirements in terms of such factors as speed, axle load and the degree or period of utilization of the infrastructure.

The Member States must ensure the access and transit on the network to railways undertakings and international groupings for the purpose of operating international combined transport goods services.

The Directive 2001/14/EEC provides that all the necessary information for access are to be published in a network statement, to ensure transparency and non-discriminatory access to rail infrastructure for all railway undertakings.

The determination of the charge for the use of infrastructure and the collection of charge have to be performed by the infrastructure manager.

Member States have to establish a charging framework while respecting the management independence laid down in article 4 of Directive 91/440/EEC.

If the infrastructure manager, in its legal form, organisation or decision-making functions, is not independent of any railway undertaking, the determination of charge have to be performed by a charging body that is independent in its legal form, organisation and decision-making from any railway undertaking.

It's also important to underline that the proposal of the Directives is to improve the efficiency in national and international transport. This objective is pursued through the promotion of competition in railways: the competition is ensured by the separation between infrastructure manager and railways undertaking.

## **2. RAIL INFRASTRUCTURE CHARGE IN EUROPE**

With the aim of promoting competition between railways undertakings, is necessary to define the charge for the use of rail infrastructure and to ensure that the access to the infrastructure isn't discriminatory for the provision of railway transport services.

Theoretically the access charge should depend on marginal cost that the railway undertaking imposes on the infrastructure manager.

The definition of marginal cost is the cost that depends on the using of infrastructure by the railway undertaking.

In addition to that, it is possible to impose on the undertakings the external costs generated by the using (e.g. pollution, accidents, congestion, noise, etc). This cost could be defined a social marginal cost.

In this case Governments will sustain the difference between marginal cost and the financial cost of the infrastructure business.

Another way to fix the charge is to add to the marginal cost a mark-up with the intend of reduce the weight for the State budget. This type of fee can also be used to improve the efficiency of the railway system, without create discrimination among users.

After all there are three different approaches to determinate the charge for the use of infrastructure:

- The charge is the marginal cost with a State compensation for the difference between marginal cost and financial cost (SCM);
- The charge is the marginal cost added with a mark-up in order to reduce (or eliminate) State compensation (MC+);
- The charge is full financial cost reduced by State compensation (FC-).

The SMC approach is recommended by Commission, but gives most pressure on the State budgets, even if could bring the most efficient use of the infrastructure.

The second approach (MC+) takes into consideration efficiency goals and budgetary needs, and reduce the State compensation.

With the third approach (FC-) the financial costs of the infrastructure manager are covered by Government (for the difference between revenues from charge and total costs); nevertheless this system has less pressure to reduce inefficiencies in use of the network.

Generally the access charge can be determinate in two different ways:

- The tariff is calculated according to the use of the network, and it is measured in function of gross tonne-km or train-km (the most common measure of infrastructure use);
- The tariff is composed by two parts: one part is variable with use, and the other part is fixed in advantage in relation to expected capacity requirements (usually scheduled train-paths or train path-km).

Obviously the first system is easier to apply and it's appropriate for less complex network, but the second system is more efficient and appropriate for mixed-use network.

This second tariff system is also applied in some case in which the fixed component of the charge is a pure access charge (unrelated to planned use of the system) or if there are large quantity discounts.

In table 1 are represented the different approaches adopted by Member States.

*Table 1: Rail Infrastructure Charges – Summary Table*

	<b>Pricing Principle</b>	<b>Fixed Charges</b>	<b>Charges per Gross T-km</b>	<b>Train-km</b>	<b>Path-km</b>	<b>Other</b>
<i>Austria</i>	MC+		✓	✓		
<i>Belgium</i>	FC-					
<i>Bulgaria</i>	MC+		✓	✓		
<i>Czech Republic</i>	MC+		✓	✓		
<i>Denmark</i>	MC+			✓		Charges per train for bottlenecks and bridges
<i>Estonia</i>	FC	✓	✓	✓		
<i>Finland</i>	MC+		✓			
<i>France</i>	MC+	✓		✓	✓	
<i>Germany</i>	FC-			✓		
<i>Hungary</i>	FC			✓	✓	
<i>Italy</i>	FC- (Traffic management only)	✓		✓	✓	Also charge per node (Train-min)
<i>Latvia</i>	FC			✓		
<i>Netherlands</i>	MC			✓		
<i>Poland</i>	FC			✓	✓	
<i>Portugal</i>	MC			✓		
<i>Romania</i>	FC	✓	✓		✓	
<i>Slovenia</i>	FC			✓		
<i>Sweden</i>	MC+		✓			Oresund bridge surcharge
<i>Switzerland</i>	MC+		✓	✓		Also charge per node
<i>UK</i>	MC+	Franchises only		✓		Per vehicle km by type of vehicle

In most Countries of Western Europe, the MC+ tariff system is applied and the cost recovery ranging from 5% (Sweden) to 63% (France). In some countries this tariff system cover part of maintenance and renewal costs, sometimes also traffic management costs and sometimes a contribution to investment.

The second tariff system considers the infrastructure manager as a commercial organization that need to recover its costs. This approach to pricing is referred to full cost recovery after receipt of grants (FC-). Only two country in Western Europe, Germany (60% cost coverage) and Italy (40% cost coverage), have adopted this tariff system. In Germany, the approach is

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applied to all costs except some investment costs; in Italy it is only applied to train planning and operations.

Italy is the unique Country in which maintenance and renewals costs are not charged for: only traffic management is included in the charges.

The full cost approach is also adopted in Eastern Europe, with the Baltic States, Hungary, Poland and Slovakia. The cost recovery ranging from 50% to 100%.

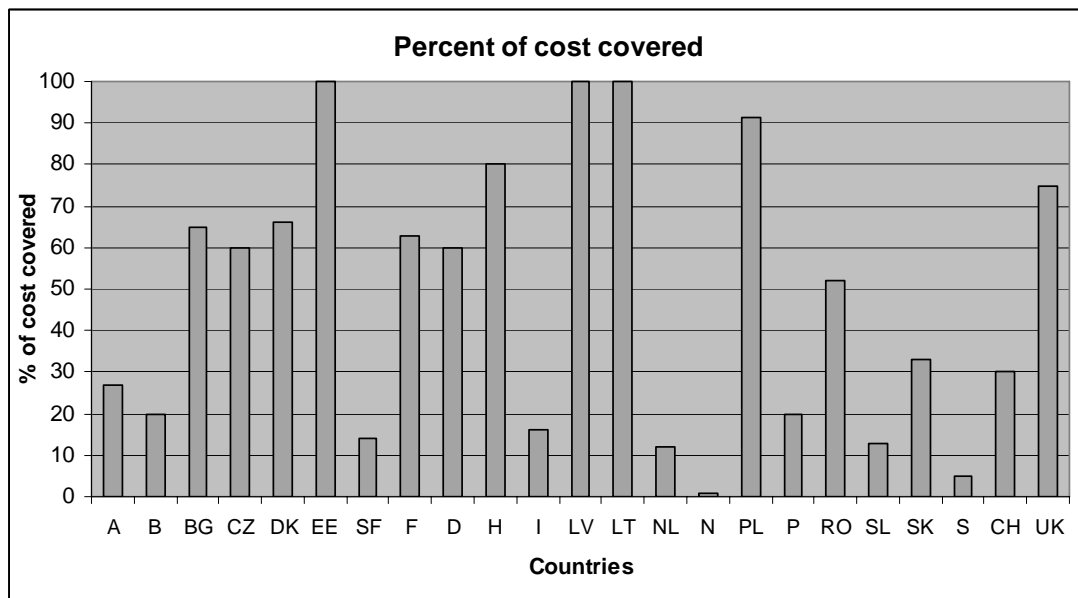
In figure 1 is represented the percent of cost recovery for European Countries. Generally costs are recovered by revenues from charges, which can be considered as a portion of total expenditure on the network on operations, maintenance, renewals, interest and depreciation.

Costs can be distinguished into fixed and variable costs. Fixed costs don't depend on the output (train-km). Costs may be considerate fixed or variable in relation on the time period over which we are looking: in a very long time, only costs that don't vary with output are the costs of past investments that do not need to be renewed. In very short run, most costs can be considerate fixed.

Generally we consider variable costs:

- Maintenance;
- Renewals;
- Train Planning and Operations;
- Congestion and scarcity;
- Accidents;
- Environment.

*Figure 1: Percent of Total Cost Covered by Infrastructure Charges*



Maintenance costs in all Countries are charged for, except Italy. Only in Sweden accidents and environmental costs are charged for, and a special noise bonus is applied in Switzerland.

Renewals, train planning and operations, congestion and scarcity are variably considerable in different Countries.

In table 2 are represented different categories included in costs as variable charges.

Table 2: categories included in costs as variable charges

	Maintenance	Renewals	Train Planning and Operations	Congestion and scarcity	Accidents	Environment
Austria	✓	X	X	✓	X	X
Czech	✓	X	✓	X	X	X
Denmark	✓	X	X	✓	X	X
Estonia	✓	✓	✓	X	X	X
Finland	✓	✓	X	X	X	✓
France	✓	✓	✓	✓	X	X
Germany	✓	✓	✓	✓	X	X
Hungary	✓	✓	✓	X	X	X
Italy	X	X	✓	✓	X	X
Latvia	✓	✓	✓	X	X	X
Netherlands	✓	X	✓	X	X	X
Poland	✓	✓	✓	X	X	X
Portugal	✓	X	✓	X	X	X
Romania	✓	X	✓	X	X	X
Slovenia	✓	✓	✓	X	X	X
Sweden	✓	X	X	X	✓	✓
Switzerland	✓	✓	✓	✓	X	noise bonus
UK	✓	✓	X	✓	X	X

Access charges are variable in European countries: they are different for freight and passenger trains.

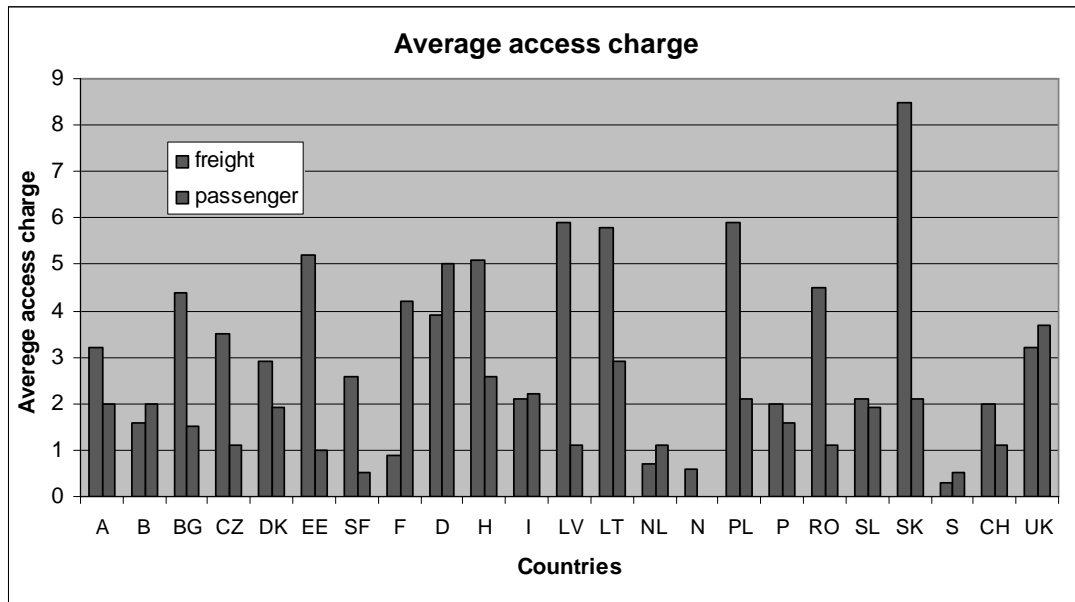
For freight trains, the maximum access charge is requested in Slovakia (8,5 euros per train-km), and the minimum is requested in Sweden (0,3 euros per train-km).

For passenger trains, the maximum access charges is requested in Germany (5 euros per train-km), and the minimum is requested in Sweden and Finland (0,5 euros per train-km). Norway is the unique country in which no access charges are requested for passenger trains.

In figure 2 the average of the access charge of European countries are represented. The access charge doesn't include the cost of electric traction.

Generally, Baltic freight trains are much larger than elsewhere, so Baltic access charges are not directly comparable with other countries and have been adjusted here.

Figure 2: Average of access charges (excluding cost of electric traction)



### 3. CHARGE FOR THE USE OF INFRASTRUCTURE IN ITALY

Italian network comprises approximately 16.000 km of track. The infrastructure manager, *Rete Ferroviaria Italiana SPA* (RFI), received in 2000 the concession for management of Italy's rail infrastructure.

In the same year was introduced infrastructure charge and currently there are five passenger operators (including the 'national' operator) and more than ten freight operators (including the 'national' operator).

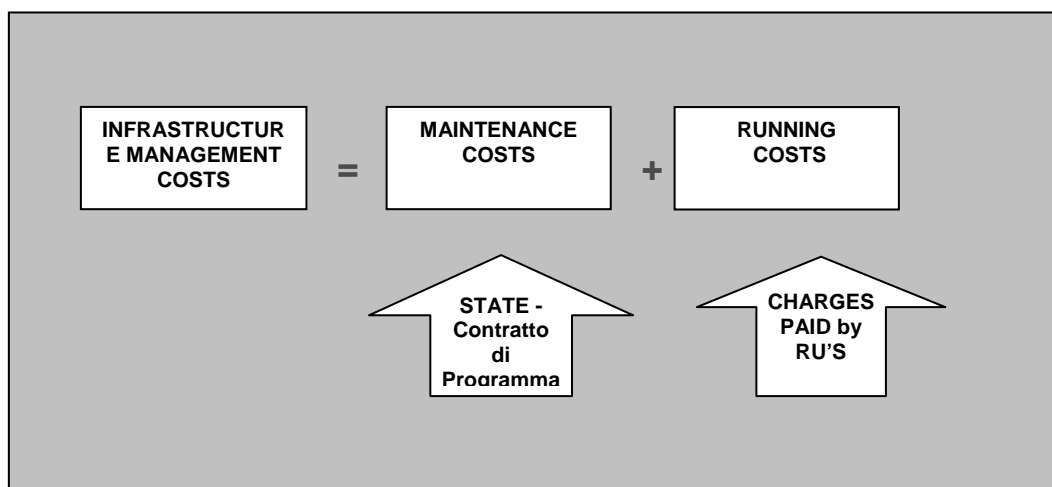
The infrastructure charge, as provided for by DLgs. 188/03, includes:

- Management of network capacity requests in order to conclude contracts;
- Use of the assigned capacity;
- Use of point switches, branch lines, and electrical supplying system (excluded electrical power supply);
- Running's control and regulation and also information concerning traffic;
- Any other needed information about services.

The other services, not included above, are supplied by paying specific charges based on costs. Also maintenance is not included in charge. In particular, the costs sustained by the infrastructure manager can be distinguished in two different parts: maintenance costs and running costs.

The maintenance costs are covered by State (through *Contratto di Programma*) and the running costs are paid by Railway Operator, as represented in figure 3.

Figure 3: Infrastructure manager (RFI) cost



These running costs are sustained by the railway undertakings which have to pay an access charge.

Actually a new algorithm for calculating the access charge is proposed by RFI.

### 3.1. Today

Today the slot price is calculated using an algorithm set out in Ministerial Decree 43T/2000. The balance between revenue from charges and the costs of train movement is considered at the national level, and not for singular lines; so that, the charge paid for using a slot could not cover completely the traffic management costs of the line. This principal is called “solidarity of network”.

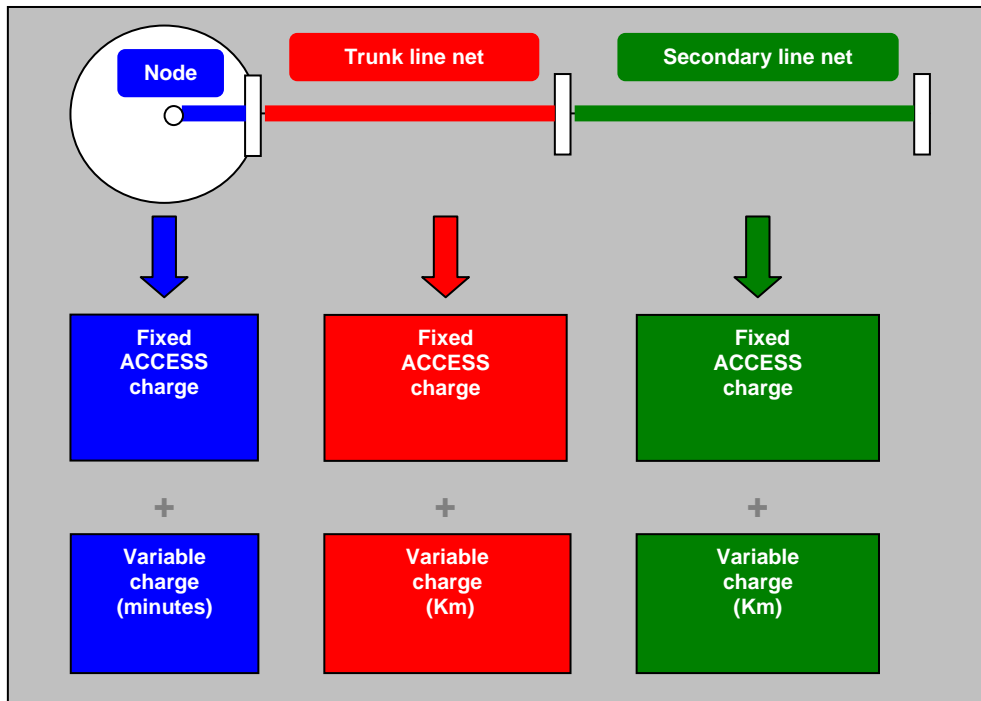
There are different kinds of charges: a fixed access charge, for node and network, that doesn't depend on traffic intensity, in which is contained a train path reservation fee (this charge covers approximately 40% of charging revenue), and a variable charge, calculated per train-km on network (approximately 48% of charging revenue) or per train-minutes at nodes (approximately 12% of charging revenues).

The fixed charge is applied indifferently for passenger and freight trains, because this charge is differentiated only by quality of the track.

In the figure 4 are represented the different kinds of charges paid by railways undertakings in Italy on the different typologies of sections.



Figure 4: Typology of section and charge



The network is divided in two parts: trunk network and a complementary network. The complementary network is divided between secondary, scarce traffic and shuttle lines. 248 sections of track are individuated, and 78 of which are in the fundamental network.

### 3.1.1. Fixed access charge

Every section has a particular fixed access charge. Also nodes (that cover the central area of a city and contain a number of stations and tracks) have a fixed access charge. In table 3 values of fixed access charge are represented.

Table 3: Values of fixed access charge of the section/node

<i>Typology of section/nodes (typology of tariff areas)</i>			<i>Price (euro)</i>
Node	Nodes	$F_{node}$	51.65
Fundamental	Double track sections – 250 km/h	$F_{fund}$	64.56
	Double track sections – 200 km/h	$F_{fund}$	56.81
	Other double track sections	$F_{fund}$	54.23
	Single track lines	$F_{fund}$	49.06
Complementary	Secondary network (single tariff area)	$F_{com}$	46.48
	Lightly trafficked lines	$F_{com}$	0.00
	Shuttle service lines	$F_{com}$	1

### 3.1.2. Variable access charge

The usage charges are calculated for nodes, for fundamental network and for complementary network in different ways, as follows described.

#### Nodes

For the use of nodes, the railway undertakings have to pay a base charge ( $p_{\text{base}}$ ) of 1 Euro per minute.

This base charge is multiplied by a factor ( $\phi$ ), that depends on the time period of use, and by another factor ( $\varphi$ ), that depends on the kind of stations of the node used (for main station of the node the coefficient  $\varphi$  is maximum).

$$P_{\text{node}} = p_{\text{base}} * \phi * \varphi * \text{minutes}$$

The time periods individuated are:

- 22:00-06:00
- 06:00-09:00
- 09:00-22:00

#### Fundamental network

For the fundamental network, the base charge is calculated by multiplying the distance travelled by a coefficient  $M$ . The base charge is 1 Euro per train-km.

Coefficient  $M$  is the mean of three factors:

- a velocity coefficient  $M_v$  (calculated in function of the difference between the operating speed and the “commercial speed” of the section, variable with the time period);
- a traffic density coefficient  $M_d$  (based on the interval between trains);
- a usage coefficient  $M_u$  (based on the weight and the number of pantographs).

$$M = (M_v + M_d + M_u) / 3$$

Access charge for fundamental network is calculated as below:

$$P_{\text{fund}} = p_{\text{base}} * M * \text{km}$$

#### Complementary network

For the complementary network, there is a base charge (1 Euro per train-km), which is multiplied by the number of train-km.

$$P_{\text{com}} = p_{\text{base}} * \text{km}$$

#### Energy

For energy costs, is requested by infrastructure manager a charge based on distance travelled (calculated as the sum of the kilometres travelled on the fundamental network, on the complementary network and on the nodes) multiplied by a base price of 0,372 Euro per km. All trains paid the same base price without any difference for train type, weight or efficiency.

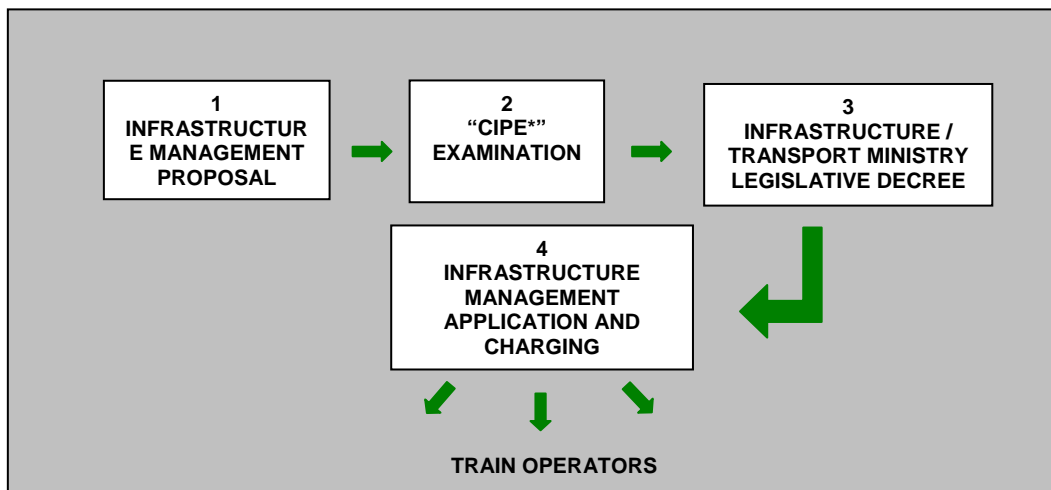
The algorithm adopted is not easy to apply. In addition, the final amount of the infrastructure charge is known only after the arrangement of the real timetable.

So that, infrastructure manager is studying some new proposals of changes. But, for the adoption of a new system of charge is necessary a Ministerial Decree.

The infrastructure manager makes a proposal of decree. This proposal is examined by CIPE (Ministries Board for Economical Planning), and finally the Ministry of Infrastructure and Transportation adopts the decree.

In Figure 5 the flow of the decree adoption is represented.

*Figure 5: Procedure of adoption of a decree about use infrastructure charges*



\*=Ministries' Board for Economical Planning

## **Tomorrow**

In the new approach, access charges are calculated as the sum of a fixed and a variable charge, just like the algorithm adopted today:

$$C = \text{Fixed Access charge} + \text{Variable Access charge}$$

Similarly, in the new system just like in the actual system, there is a separation of the infrastructure between fundamental network, complementary network, and nodes.

Nevertheless, fixed access charge is determinate in a different way, as represented in table 4.

Table 4: Fixed access charge in the new and the actual system

New system	Nodes	$F_{\text{node}}$	F variable with time period
	Fundamental network	$F_{\text{fund}}$	F variable with demand and speed F variable with line, direction and time period
	Complementary network	$F_{\text{com}}$	F constant
Actual system	Nodes	$F_{\text{node}}$	F constant
	Fundamental network	$F_{\text{fund}}$	F variable with quality of the line in terms of number of tracks, speed and technological equipment
	Complementary network	$F_{\text{com}}$	F variable (secondary network, lightly trafficked lines, shuttle service lines)

Variable charge too is modified in the new approach.

In particulars node access charge depends on the distance travelled (instead of travel time) multiplying by the base charge, plus a fixed cost (c) for use of the terminal station. The base charge is constant because in the nodes the speed is nearly the same for all the trains. Only the use of the terminal stations must be paid because this use implies a major consumption of capacity.

Variable access charge for fundamental network depends on the distance travelled and on a slot coefficient (M). The slot coefficient is calculated as the percentage difference from a reference velocity. The reference velocity depends on train category (freight, high speed, regional, etc), line, direction and time period. The usage is considered only for heavy freight trains.

Variable access charge for complementary network is not changed.

In table 5 variable access charge of the new and the actual system is represented.

Also a new zoning is foreseeing, with three different targets:

- Review of the perimeter of nodes (enlargement of the borders);
- Uniformity of the lines of fundamental network (some lines are united and some other are divided to have similar extensions);
- New arrangement of some complementary lines (in the actual system classified as fundamental lines).

Table 5: Variable access charge in the new and the actual system

New system	Nodes	$P_{\text{node}} = p_{\text{base}} \text{ km} + N_{\text{s.t.}} * c$	P variable with distance travelled and number of terminal station
	Fundamental network	$P_{\text{fund}} = p_{\text{base}} * M * \text{km}$	P variable with the distance travelled and with a slot coefficient
	Complementary network	$P_{\text{com}} = p_{\text{base}} * \text{km}$	P variable with distance travelled
Actual system	Nodes	$P_{\text{node}} = p_{\text{base}} * \phi * \varphi * \text{min}$	P variable with travel time, time period of use ( $\phi$ ) and kind of station used ( $\varphi$ ) (for main station of the node the coefficient $\varphi$ is maximum).
	Fundamental network	$P_{\text{fund}} = p_{\text{base}} * M * \text{km}$	P variable with distance travelled multiplying by a coefficient M. This coefficient is a mean of three factors: a velocity coefficient $M_v$ ; a traffic density coefficient $M_d$ ; a usage coefficient $M_u$
	Complementary network	$P_{\text{com}} = p_{\text{base}} * \text{km}$	P variable with distance travelled

## CONCLUSIONS

The introduction of charge for infrastructure use has determined the consequences that every European infrastructure manager has developed its own system of fee.

Not all the costs are covered in same way in European countries. Maintenance costs in all Countries are charged for, except Italy. Only in Sweden accidents and environmental costs are charged for, and a special noise bonus is applied in Switzerland.

Also access charges are variable: they are different for freight and passenger trains. For freight trains, the maximum access charges is requested in Slovakia (8,5 euros per train-km ), and the minimum is requested in Sweden (0,3 euros per train-km).

For passenger trains, the maximum access charges is requested in Germany (5 euros per train-km), and the minimum is requested in Sweden and Finland (0,5 euros per train-km). Norway is the unique country in which no access charges are requested for passenger trains.

The system of charge in Italy covers the 16 % of total costs. The actual system is not easy to apply. In particular the fee is known only after the arrangement of the real timetable, and there are 14.000 different fees.

The adoption of a new algorithm easier to applied is proposed.

The aim of this new methodology is:

- to have an easier charge system (with only 1.400 different fees);
- to contain the total amount of the fee for railway undertakings, specially for regional services, with the review of the perimeter of nodes (enlargement of the borders);
- to homogenize the incidence of fixed access charge through the uniformity of the lines of fundamental network (some lines are united and some other are divided to have similar extension);
- to homogenize the charge of national services through a new arrangement of some complementary lines (in the actual system classified as fundamental lines).

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