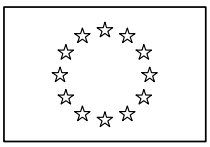

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 6.2.2008
SEC(2008) 132

COMMISSION STAFF WORKING PAPER

Document accompanying the

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

Multi-annual contracts for rail infrastructure quality

FULL IMPACT ASSESSMENT

{COM(2008) 54 final}
{SEC(2008) 131}
{SEC(2008) 133}

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1. PROBLEM DEFINITION

The present report provides an overview of the main impacts involved with three different policy options regarding the implementation of multi annual contracts (MACs) for rail maintenance financing.

The major problem is the declining infrastructure quality in certain parts of the Community, which results from inappropriate funding of infrastructure maintenance. Without this problem solved, maintenance backlogs will build up further and eventually constrain railways' ability to compete with other modes of transport.

EU Member States reported that, in 2004, they spent € 17.5 billion on the maintenance, renewal and new construction of railway infrastructure. This figure does not include funds from public-private partnerships. After adding revenue from user charges, EU infrastructure managers spent well over € 25 billion per year on infrastructure development, which gives some indication of the financial impact.[1]

About 69% of infrastructure managers declare[2] that their maintenance budget is sufficient to maintain a sustainable railway system, hence 31% do not have sufficient budget. Those who do not have sufficient budget have average annual deficits varying from 10% to 89%. Such scarcity of funds has caused an investment backlog in maintenance and modernisation.

The costs covered by the access charges vary substantially in different Member States. Cost recovery ratios of European infrastructure managers vary between 20% and 100%[3]. Consequently, state contributions are indispensable for the functioning of the rail infrastructure. Such contribution to the railway sector, meant to cover the financial gap, tend to fluctuate on a yearly basis in the Member States. The insecure outcomes of negotiations on the annual State budget leads to uncertainty regarding the level of funding, and consequently the level of works needed to maintain the railways to a predefined quality standard. Infrastructure managers have traditionally been funded on a year-by-year basis by Member States. In these circumstances, Member States can find it difficult - faced with year-to-year political priorities and budgetary pressures - to resist the temptation to order infrastructure managers to "wait until next year" to fund network renewal and in some cases even maintenance. The cumulative effect of such delays increases the costs of network operation and increases the cost of investment planning.

The practice of year-to-year funding is inconsistent with the objective of efficient, customer-orientated infrastructure management, particularly as rail infrastructure projects i.e. construction, upgrading or major renewal, are capital-intensive and their planning and implementation extends over many years. The infrastructure manager needs long-term financial commitments for its business planning, whereas the State

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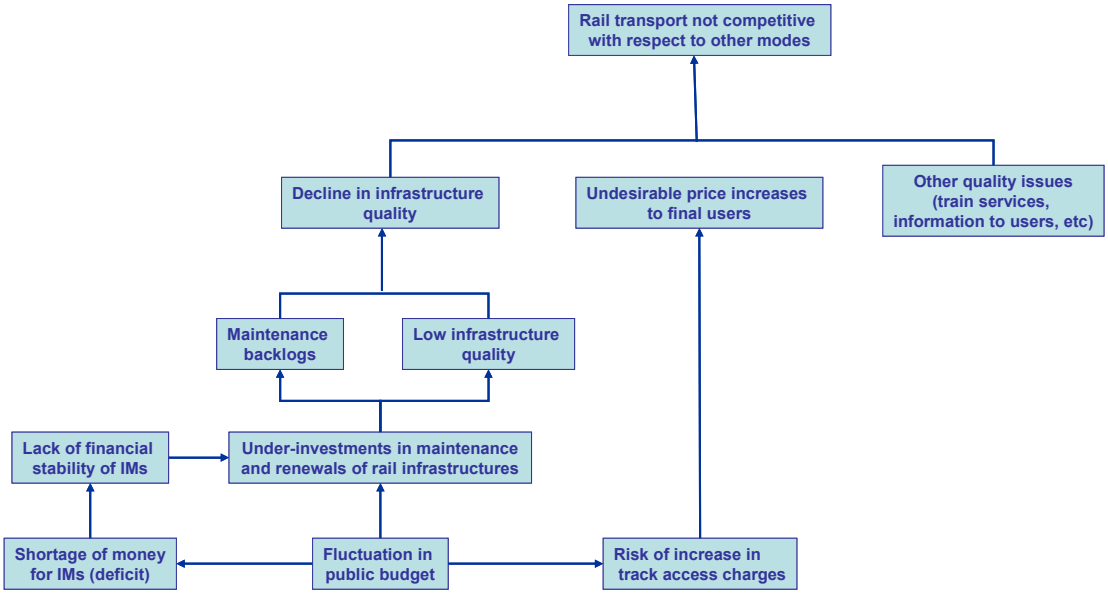
1 DG TREN consultation document on multi-annual contracts, page 2.

2 Guidelines for sustainable partnerships in railway maintenance, Ecorys, November 2006.

3 CEMT Report "Railway reform and charges for the use of infrastructure", CEMT/CM(2005)6.

(Ministry of Finance) uses to commit funds only for the current budgetary period of one year. A joint approach towards railway maintenance finance is lacking.

Figure 1-1 – Problem Tree



Looking at the problem from an institutional point of view, a major issue is related to the impacts of the restructuring of the rail sector: the lack of separation between infrastructure and service provision have made debts arise as infrastructure quality and the quality of service declined. The problem tree highlights how the different problems impact on one another.

DG TREN identified such problems arising form the lack of a proper contractual framework for infrastructure financing and maintenance and, based on the consideration of such problems, has recognised the importance of multi–annual contracts as a key factor in order to sustain a rail revitalisation strategy.

The EU's right to act as based on importance of infrastructure quality for establishing an European rail transport service market[4] and, more specifically, on the obligations on Member States to meet the commitments on sustainable financing they made when adopting the first railway package[5].

According to the **subsidiarity principle** the problems identified above affect the functioning of cross border railway traffic (e.g. the low quality of infrastructure service combined with high track access charges in certain Member States), involve trans-national aspects that require an action to be taken at the EU level

4 Treaty of the European Communities, article 70

5 Directives 91/440/EC, 2001/12/EC, 2001/13/EC and 2001/14/EC

2. CONSULTATIONS OF INTERESTED PARTIES

DG TREN organised a stakeholder workshop in May 2006, the main conclusions of which was that multi-annual contracts could increase the performance of infrastructure management. The workshop recommended this mechanism and suggested to apply it more widely.

A study commissioned by DG TREN in 2006[6] provided best practice information on important features of multi-annual contracts, such as the opportunity to shift from a conflict relationship between the State and the Infrastructure Manager towards to long-term partnership based on clear mutual rights and obligations. This study consulted relevant stakeholders and collected best practice information on important features of multi-annual contracts. It concluded that, though starting positions regarding rail maintenance financing differ in different Member States, the planning mechanisms and contract agreements can substantially be improved in many cases. Whereas the level of investments in the rail network on capital work and maintenance remains a political choice, a possible step ahead would be the use of improved planning mechanisms, in order to make clear what the consequences are of different maintenance budgets on the quality and size of the rail network.

DG TREN launched a public consultation in July 2007, to get the point of view of stakeholders on: a) the problems connected to the lack of a proper contractual framework to finance infrastructure maintenance and renewal, b) the objectives of a multi annual contractual approach between Member States and infrastructure managers, and c) actions needed to promote multi-annual contracts in the EU. The consultation, launched on 12 July, has ended in September: a summary of the results of the consultation was published at the DG TREN web site.

Besides, a specific consultation (survey) with relevant stakeholders has been made within a preparatory study for the present impact assessment[7], in order to analyse specific arguments/impacts that were not fully analysed in previous studies and not fully stressed in the issued consultation document.

3. OBJECTIVES

The main objectives of a strategy to provide best practice on certain aspects of implementing the first railway package using multi-annual contracts between the State and the infrastructure managers

– to contribute to the stable business models in the sector of rail transport services through long term predictability of charges which allow rail to be competitive towards other modes of transport;

– to shift towards a more cost effective rail infrastructure maintenance along with an stronger orientation on users' needs;

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6 Guidelines for Sustainable Partnerships in Railway Maintenance, Ecorys, November 2006.

7 Preparatory Study for an impact assessment on rail infrastructure quality, PriceWaterhouseCoopers, 2007

– to create the conditions for infrastructure managers' financial stability in the medium term and their management independence.

4. POLICY OPTIONS

DG TREN has identified and presented in its Consultation Document, issued on 12 July 2007, the following policy options.

Option A: "business as usual": implementation of multi-annual contracts only on some Member States, whereas the other decide on an annual basis to cover losses of the infrastructure manager. Some currently observed problems remains. A few examples:

– States requiring the infrastructure manager to keep open lines or terminals in a discretionary manner without respect of profitability;

– no clear sanctions or penalties in case the infrastructure manager fails to deliver the expected infrastructure quality at the expected costs;

– lack of transparent and public information on the network quality and the effective use of the public funds.

This option is similar to the "No EU action" option as defined in the IA guidelines, but it is foreseen that Commission services synthesise best practice, including a reporting format on infrastructure condition and best practice on negotiating, amending and extending multi-annual contracts.

Option B: Obligations regarding the reporting, consultation and publication of information on infrastructure quality and the costs of maintenance: enforcement of the existing obligation of infrastructure managers to reduce costs and charges according to directive 2001/14/EC article 6.2. Member States, assisted by their regulatory bodies, have to agree, monitor and enforce quantified targets on cost reduction. Infrastructure managers publish at least annually on the results. It remains up to Member States whether they conclude multi-annual contracts in addition to regulatory measures. Increased transparency of infrastructure cost / quality data will allow the comparison between infrastructure managers of different rail networks, and allow the public opinion to be informed on public funds' utilisation.

Option C: The obligations under option B plus multi-annual agreements are made mandatory through revised EU legislation: obligation of multi-annual contracts. The state consults stakeholders on a proposal for multi-annual contracts before letting a new contract and then negotiates the size and the quality of the network, which are, then, monitored. Discretionary intervention by the state is strictly limited to cases foreseen in the contract, while infrastructure manager pursues the agreed objectives under large management independence.

5. ANALYSIS OF IMPACTS

Data used for quantitative (but also qualitative) analyses, necessary for the estimates of parameters impacting on the likelihood and /or on the magnitude of the identified impacts have been collected through different sources.

Data related to the infrastructure management policies (existence of multi-annual contracts, their duration and the existence of outsourcing practices), have been collected through desk analyses and a survey. In addition, the most literature was surveyed.

Infrastructure Managers data (economic data and infrastructure and traffic data) and information on State budget, where not available from the PwC survey, have been collected using different source, mainly infrastructure managers' Annual Reports (2005), Survey CE (2006), International Railway statistic – UIC (2005), Eurostat statistics (2005) and PwC Survey for the IA (2007).

The screening of likely impacts has led to the identification of the following direct impacts, which have direct reflections on the infrastructure management and on the infrastructure managers' financial balance[8]:

– Impact n. 4 (a, b and c): infrastructure managers costs savings for maintenance costs reduction;

– Impact n. 5: administrative costs (due to the set-up of a public system for monitoring rail infrastructure quality and costs);

– Impact n. 3 (a and b): impacts on infrastructure quality, because of higher pressure on the infrastructure manager due to the increased transparency of infrastructure and to demand-tailored maintenance and renewal policies allowed by the multi-annual planning framework of those activities.

The total impact on the infrastructure manager's financial equilibrium is given by the balance between the impacts on costs and the indirect impacts on infrastructure manager revenues, which are assessed in the estimate of indirect impacts of multi-annual contracts (Impacts n.6a and 6b and n.11).

For instance, reduced maintenance costs translate into lower infrastructure charges, which affects the infrastructure managers' financial balance. At the same time lower charge will result in lower price for final users and (depending on traffic elasticity to prices) in increased traffic demand, which compensates the infrastructure manager's revenue losses.

For further example, if costs savings are earmarked to improve quality of infrastructure this will probably have no direct impact on the infrastructure managers' financial balance, unless the better quality attracts a higher traffic demand (depending

[8] The numbering is consistent with the long version of the impact assessment. Certain numbers miss due to insignificant impacts having been skipped.

on traffic elasticity to quality of the service), thus resulting in additional revenues (and variable costs) for the infrastructure managers.

Impacts that could not be analysed in quantitative terms were assessed on the basis of their likelihood (not on their level or magnitude). Furthermore, it is assumed that no impact occurs in the country where a multi annual contract has already been implemented. Other conditions for the impacts to occur regard: the duration of multi annual contracts, the presence / absence of outsourcing for maintenance and, in some cases, quality parameters. In theory, significant cost savings impacts are unlikely in case of networks with very low quality. However, infrastructure quality data are limited available for many countries.

5.1. Economic impacts

Maintenance costs reduction

On the basis of the answers to the survey, these impacts are confirmed as likely or very likely outcome of the implementation of multi-annual contracts.

Table 5-1 – Summary of consultation's answers on maintenance cost impacts of Multi Annual Contracts

	Multi Annual Contracts will determine maintenance cost savings because of	*% of positive answers*	
		Infrastructure Managers	*Ministries of Transport and Regulatory Bodies*
4a	**increased efficiency of the use of resources**	78%	75%
4b	**increased efficiency in outsourcing maintenance**	44%	75%
4c	**more advanced personnel reduction policies**	56%	50%

According to the answers received, the expected magnitude of cost saving is higher for the increased efficiency allowed by better scheduling of works, and for the economy of scale due to longer (and therefore larger) outsourcing contracts, whereas the internal personnel costs appear to be more difficult to reduce even in the medium-term framework of the multi-annual contracts.

Table 5-2 - Expected magnitude of Multi Annual Contracts cost impacts declared by the consulted actors

	Multi Annual Contracts will determine maintenance cost savings because of	*Expected % of maintenance cost saving*			
		MIN	*Average*	*MAX*	*N. of answers*
4a	**increased efficiency of the use of resources**	2%	5%	10% or more	6
4b	**increased efficiency in outsourcing maintenance**	5%	7%	up to 10%	3
4c	**more advanced personnel reduction policies**	0,1-0,5%	2%	3%	3

The impact on each member country and the annual maintenance cost savings (in % and in Euro) have been estimated and table 5.3 summarizes the result of the calculation. The overall impact can be quantified in 6,77% for Countries where such impact is expected. The most important savings are due to the increased efficiency allowed by better planning of maintenance activities.

Table 5-3 – Results of the estimate of impacts on maintenance costs reduction

	Multi Annual Contracts will determine maintenance cost savings because of	*Impact yes / no (n. of countries)*					*Estimated savings*		
		NO because a Multi Annual Contract is already implemented	*NO because maintenance is covered by charges*	*NO because there is no outsourcing*	*No because maintenance fully outsourced*	*YES*	*Total savings (Million Euro)*	*% of total maintenance costs in countries with impacts*	*% of total maintenance costs in EU-25*
4a	**efficiency of the use of resources**	5	4			16	337,12	3,50%	2,59%
4b	**efficiency in outsourcing maintenance**	5	4	2		14	110,07	2,30%	0,85%
4c	**Personnel reduction**	5	4		1	15	91,34	0,99%	0,70%
	Total						**583,53**	**6,77%**	**4,12%**

Impacts on infrastructure charges

The maintenance cost reduction expected for some countries as result of implementing multi-annual contracts is likely to induce a reduction of the infrastructure charges that the railway undertakings have to pay to use the rail infrastructure. The following table summarizes the result of this analysis. Reduction of charges is likely in 16 Member States out of 25. The average reduction amounts to 0,21 € / train.km in the countries where all the savings are allocated to reduction of charges and 0,07 € / train.km in the countries where only half of them are dedicated to that purpose.

Table 5-4 – Expected charges reduction due to maintenance cost savings

	Countries			
	witht maintenance cost savings	*Of which*		
		with 100% of cost savings allocated to charges reduction	*with 50% of cost savings allocated to charges reduction*	*with 0% of cost savings allocated to charges reduction*
Number of countries	16	8	7	1
Average charges reduction per train.km		0,21 € / train.km	0,07 € / train.km	0 € / train.km

The charges reduction appears to be quite low compared to the infrastructure charges that are usually between 2 and 4 Euro / train km on average. Two reasons explain this result, i.e. (1) the estimated savings are less than 7% of total maintenance costs and (2) the charges do not cover maintenance costs only, but also other infrastructure managers' cost items.

Direct impacts on infrastructure quality

Impacts 3a and 3b Improvement of infrastructure quality

In addition to the increase of administrative costs, the set up of a public system of monitoring infrastructure costs and quality is also likely to put higher pressure on infrastructure managers because of the increased transparency of the infrastructure. This, together with the possibility of demand-tailored maintenance and renewal policies, allowed by the multi-annual planning of these activities, will allow a better quality of the infrastructure. Such impacts arise for a small number of countries, as most of the EU countries presents on high average levels of infrastructure quality.

The results of the analyses are summarised in the following Table.

As indicated by the table above, relevant parameters impacting on the magnitude of the effects on the infrastructure quality are safety (expressed in terms of number of derailments/train km) and punctuality (expressed in terms of % of train on time).

The analyses give as a result an average increase in train punctuality of 2,56%, while security will be also significantly improved with the reduction of the number of derailments (average estimate on EU 25: -0,036). The average (EU 25) present level of derailments is 11,08.

Table 5-5 – Impacts on infrastructure quality

Impacts				
	Estimated magnitude on Safety (%)	*Estimated magnitude on Punctuality (%)*	*Safety difference after-before the Multi Annual Contract (# derailments per millions train km)*	*Punctuality difference after-before the Multi Annual Contract (%)*
Average values (EU 25)	5,630%	2,823%	-0,036	2,556%

The following table gives the results of the assessment of the likelihood of economic impacts which have not been the object of quantitative assessment, expressed in total km of tracks in Countries experimenting / not experimenting the impacts.

Table 5-6 – Results of qualitative analyses of economic impacts

N.	***Impact description***	*Impact yes / no- km of network tracks (n. of countries)*					
		NO because a Multi Annual Contract is already implemented	*NO because maintenance is covered by charges*	*NO because there is no outsourcing*	*No because maintenance fully outsourced*	*No because quality is very poor*	*YES*
1	Improved competitive position of rail transport	72.776 km (5 Countr.)					248.378 km (20 Countr.)
4d	Possibility to avoid training costs for unskilled resources that results when maintenance is defined on an annul basis	72.776 km (5 Countr.)			4.698 km (1 Country)		243.679,520 (19 Countr.)
4e	Additional (unplanned) savings generated by incentives on managers (and possibly staff) on achieving the planned ones.	72.776 km (5 Countr.)					248.378 km (20 Countr.)
6b	Better quality and better availability of the service for final users because of better infrastructure quality	72.776 km (5 Countr.)				26.060 km (3 Countr.)	229.288 km (17 Countr.)
7	Costs savings can be used to reduce the State financial commitments[9]	72.776 km (5 Countr.)	22.104 km (4 Countr.)			26.060 km (3 Countr.)	207.183 km (13 Countr.)
2	Tendering of infrastructure management	72.776 km (5 Countr.)				26.060 km (3 Countr.)	229.288 km (17 Countr.)

[9] The likelihood of this impact has been evaluated regardless the hypotheses on impacts on charges.

(*) The magnitude of the impacts is expressed in terms of km of tracks of the network where the impact is expected.

5.2. Social impacts

Impact n.6 a) - Impact of infrastructure charges reduction on service price to final customers

The expected reduction in infrastructure charges is likely to reduce the total train operating costs for railway undertakings, and, potentially, the final service price to users[10]. The service price decrease is estimated between 0,003% and 4,917 % in the 8 countries where all infrastructure managers' cost savings are supposed to be allocated to charges reduction, and between 0,121% and 2,646% in the 7 countries where only a portion of the infrastructure manager's savings are used to reduce the charge.

Given the above presented rail price reduction for the user, the likely increase in traffic has been estimated[11]. A shift from road traffic to rail is likely to happen in 14 countries (where a service price reduction >0% is expected). The total estimated reduction of road traffic will be 6.545 million ton km (i.e. 861 million vehicle.km) per year.

Table 5-7 – Results of qualitative analyses of social impacts

N.	***Impact description***	*Impact yes / no- km of network tracks (n. of countries)*					
		NO because a Multi Annual Contract is already implemented	*NO because maintenance is covered by charges*	*NO because there is no outsourcing*	*No because maintenance fully outsourced*	*No because quality is very poor*	*YES*
8	Security of employment facilitating new job creation over a long-term perspective	72.776 km (5 Countr.)					248.378 km (20 Countr.)
9	Stable financial perspective, allowing more secure jobs, will also increase staff satisfaction and job quality.	72.776 km (5 Countr.)					248.378 km (20 Countr.)

[10] Theoretically, the railway undertakings can also decide to recover a part of their operating deficit (if any) or to use the saved resources to other purposes (e.g. new rolling stock investments). Within this IA, however, it is assumed that the savings will be entirely transferred to final users, as already stated in the Inception Report.
The reduction rate in service price will be calculated as the ratio between the total savings in charges for the railway undertaking (expected infrastructure charges reduction per train.km multiplied by the total traffic on the given network) and the total user revenues on that network. The estimated reduction in % will be considered as equally applied to all type of traffics: freight trains, long distance passenger trains, regional trains.

[11] The analysis has been focused on freight traffic only, because the elasticity of the demand for passengers transport presents a higher variance between different Member States than values of freight transport elasticity. Furthermore, an average value for passengers transport elasticity is not available, while such an average value is present for freight transport in literature (Winston 1985, Small & Winston 1999; Wohlgemuth 1998 gives an estimate for different groups of OECD Countries, and, therefore for the EU 25).

N.	Impact description	Impact yes / no- km of network tracks (n. of countries)					
		NO because a Multi Annual Contract is already implemented	*NO because maintenance is covered by charges*	*NO because there is no outsourcing*	*No because maintenance fully outsourced*	*No because quality is very poor*	*YES*
10	Improved transparency to member States, taxpayers and other stakeholders regarding financing of infrastructures.	72.776 km (5 Countr.)					248.378 km (20 Countr.)

(*) The magnitude of the impacts is expressed in terms of km of tracks of the network where the impact is expected.

5.3. Environmental impacts

Impact n.11 - Impact of rail traffic increase on environment

Given the calculated road traffic reduction and the emission factor of the pollutants (g / vehicle.km), the expected impact of multi-annual contracts on air pollution will be the following[12].

Table 5-8 – Impacts on environment

	Reduction of emission due to the reduction of road traffic	***Increase of emissions due to the increase of rail traffic***	***Total net effect***
NOx	- 6.482,9 tons / year	+ 783,3 tons / year	- 5.699,6 tons / year
PM10	- 161,3 tons / year	+ 47,4 tons / year	- 113,9 tons / year
CO2	- 608.933,1 tons / year	+ 44.173,5 tons / year	- 564.759,5 tons / year

The modal shift to rail will cause a slight increase in rail transport emissions, due to the diesel traction of some trains. This increase is, however, much lower than the reduction of air pollutants (NOx, PM10) and greenhouse gases (CO2) expected as result of road traffic diminution.

It is important to highlight that these impacts on environment concern only 15 countries where the conditions exist for such impacts: no multi-annual contracts in the current situation, charges covering (but not totally) the maintenance costs, infrastructure quality not very poor.

[12] Emission factors for the more significant pollutants (CO2, NOx, PM) have been applied to the estimated reduction of road traffic in order to estimate environmental benefits. The emission factors are derived from the TREMOVE database.

5.4. Impacts on administrative costs

Impact n.5 Administrative costs

Implementing multi-annual contracts according to policy options B and C provides the infrastructure managers with obligations regarding reporting, consultation and publication of information on infrastructure quality and the costs of its maintenance. The main responsible for data collection and reporting will be most probably the infrastructure manager. Thus, the obligations will cause additional administrative costs to the infrastructure managers.

Two cases have been considered:

(a) the infrastructure manager has to collect only data about train traffic regularity (e.g. delay minutes and causes, presence of temporary speed restrictions and their duration) and amount of accidents, incidents, deaths and injured people (all these data depend also on the performances and responsibilities ofrailway undertakings and on human factors).

In case a), the required measuring system is certainly necessary also for traffic control (requiring computerized systems to register all train movements and measure irregularities) and for allocating delays responsibility, not just for monitoring . Further administrative costs due to compliance of the system in place to the requirements of the new system could be eventually only those due to a new way of collecting and elaborating the raw data for calculating the new agreed indicators.

(b) the infrastructure manager has to collect, in addition, more infrastructure-specific quality data (rail consumption, track geometry, catenary consumption and geometry, …) and calculate specific indicators representative of its infrastructure management effectiveness.

Cost for the data collection system of case b), are much higher than those arising in case a), in particular when from the survey emerges that regularity is already monitored (as in countries where there is a legally compulsory performance regime).

Taking into account the above-mentioned conditions, apart from the existence of a multi-annual contract in the Member State, administrative costs have been estimated in terms of:

- total costs for the duration if each infrastructure manager has to buy the number of measurement train necessary for its network;

- total costs for the contract taking into account the possibility of buying and selling the measurement train service in the European network (i.e. sharing the trains among the networks)

The impact is likely to arise for 21 Member States.

Table 5-9 – Infrastructure Managers' Administrative costs estimate

Impacts		
Hypotheses	*Initial investment expenditure [M€]*	*Annual operating costs [M€/year]*
Each Member State buys and operate its own measurement train	513,83	35,16
Sharing of the measurement train service within the European network	69,44	4,75

An "optimal" duration of 4 years has been used within the present impact assessment. Besides administrative costs arising for the infrastructure managers for the collection and elaboration of data, some costs are likely to arise for the controlling body, in charge of monitoring the performance of the contract as regards fixed objectives and, in case, of solving disputes between the State and the infrastructure manager, in case objectives are not reached. This controlling role has to be continuing over time in order to allow the regulatory body to intervene on time. The monitoring body exerts competences as regards (1) technical matters, in order to evaluate the network quality, (2) economic matters necessary for the evaluation of financial indicators and (3) legal and administrative competences, for the decisions to be taken in case of disputes. The following table summarises the administrative cost for the regulatory bodies.

Table 5-10 – Independent monitoring bodies' administrative costs estimate

Type of employees	*FTE*		*Estimated total personnel cost / FTE * (€ / year)*	*Total personnel cost * (€ / year)*	
	Small networks	*Medium / large networks*		*Small networks*	*Medium / large networks*
Specialised professional for monitoring and reporting	2	4	88.000	176.000	352.000
Specialised technicians	2	3	48.000	96.000	144.000
Total				272.000	496.000
Other monitoring office costs (utilities, etc.) (10% of personnel costs)				27.200	49.600
Total				**299.200**	**545.600**

* These amounts are valid for the Italian labour market. For the other Countries the equivalent costs per FTE have been estimated taking into account the ratios of GDP per head with respect to Italy.

Based on the above hypotheses, administrative costs of independent monitoring bodies for all 25 Member States will be 844.800 € / year (299.200 for small networks and 545.600 for medium large networks).

6. COMPARING THE OPTIONS

The evaluation of the impacts related to the proposed options A, B and C (see chapter 4 for the description of the policy options), is presented in **Table 6-1**. The evaluation has been carried out according to the following assumptions:

– for option C, the estimated impacts concern all countries where no multi-annual contract was in place in the basis year considered in this analysis (2005); this corresponds then to the full impacts estimated in previous chapter;

– for option A, the impacts estimated in option C will occur only in the countries that have already implemented multi-annual contracts after 2005 (France, Poland, Spain, Netherlands and Denmark) or that are likely to implement it (Germany, Slovak Republic and Hungary) because already negotiating such a kind of agreement between the infrastructure manager and the State;

– for option B, we consider same situation as in option A + the quality-related impacts of option C, since such impacts depend mainly on the monitoring system that is foreseen also in option B.

Table 6-1 – Quantitative assessment of impacts of the proposes options

For qualitative impacts, the number of countries that are concerned by the impact & the km of tracks of their networks are presented

Macro-category of impacts	Impacts on:	Identified impact	Unit of measure	Option A	Option B	Option C
Economic	**Operating costs and conduct of business**	4a)infrastructure manager cost savings because of increased efficiency of the use of resources, in particular maintenance works scheduled more efficiently (i.e. tailored to forecasted traffic)	Million Euro / year	257,0	257,0	337,1
		4b)infrastructure manager cost savings because of increased efficiency in outsourcing maintenance activities (economy of scale obtained by tendering longer multi-annual contracts)	Million Euro / year	95,7	95,7	110,1
		4c)infrastructure manager cost savings because of more advanced personnel reduction policies thanks to medium-term planning horizon	Million Euro / year	76,4	76,4	91,3
		4d)infrastructure manager cost savings because of the possibility to avoid training costs in cause of use of unskilled resources that results when maintenance level are defined on a year-by-year basis	km of tracks & number of countries	163.104,2 km (7 Countries)	163.104,2 km (7 Countries)	243.679,5 km (19 Countries)
		4e) Additional (unplanned) infrastructure manager cost savings generated by incentives on managers (and possibly staff) on achieving the planned ones.	km of tracks & number of countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	248.377,5 km (20 Countries)
		3) Improvement of infrastructure quality because of higher pressure on infrastructure managers due to the increased transparency of infrastructure (due to the set-up of a public system for monitoring rail infrastructure quality and costs) and demand-tailored maintenance and renewal policies allowed by multi-annual planning	Reduction of n. derailments per million train km	- 0,009	- 0,036	- 0,036
			Increase in punctuality	+ 2,73%	+ 2,56%	+ 2,56%

Macro-category of impacts	Impacts on:	Identified impact	Unit of measure	Option A	Option B	Option C
Economic		framework	Traffic involved by the increase in punctuality (million train km)	1.291,5	1.776,5	1.776,5
	Administrative costs on business	5) Cost for the infrastructure managers for the implementation of the system (investment costs), where it does not exist yet. Further costs (maintenance costs) will be connected to the necessity of maintaining the system and for the development and measurement / monitoring of synthetic indicators.	Million Euro Investment Costs (option: investments by each MS)	178,5	513,8	513,8
			Million Euro Investment Costs (option measurement trains shared among European rail networks)	44,2	69,4	69,4
			Million Euro / year management costs (option: investments by each MS)	12,2	35,2	35,2
	Administrative costs on business	5) Cost for the infrastructure managers for the implementation of the system (investment costs), where it does not exist yet. Further costs (maintenance costs) will be connected to the necessity of maintaining the system and for the development and measurement / monitoring of synthetic indicators.	Million Euro / year management costs (option: measurement trains shared among European rail networks)	3,0	4,8	4,8
	Administrative costs on business	5) Cost for the Regulatory Bodies for specialized professional for monitoring and reporting, specialized technicians and other monitoring office costs (utilities, etc.)	Million Euro / year	3,3	9,9	9,9
	Consumers and	6a) Reduction of train price to the final users in case the cost savings are totally or partially used to reduce	(% price reduction)	0,76%	0,76%	0,70%

Macro-category of impacts	Impacts on:	Identified impact	Unit of measure	Option A	Option B	Option C
	households	infrastructure charges, and the financial situation of railway undertakings allows them to transfer the savings to the final customers	Traffic involved by the price reduction (million train km)	2.361,3	2.361,3	3.972,6
		6b) Better quality and better availability of the service for final users because of better infrastructure quality	km of tracks & number of Countries	167.802,3 km (8 Countries)	229.287,5 km (17 Countries)	229.287,5 km (17 Countries)
	Public Authorities	7) Costs savings can be used to reduce the State financial commitments	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	207.183,4 km (13 Countries)
Economic	**Competi-tion in the internal market**	1) Improved competitive position of rail transport because of better financial stability ofinfrastructure managers, and (possibly) additional resources arising frominfrastructure manager efficiency that can be used a) to reduce the rail charges to be paid by rail undertakings, and / or b) to improve the quality of infrastructure.	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	248.377,5 km (20 Countries)
		2) Tendering of infrastructure management: after the end of a MAC and the evaluation of its performance, the infrastructure management could be tendered, thus creating a new market	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	229.287,5 km (17 Countries)
Social	**Employ-ment and labor markets**	8) More stable financial perspective both for infrastructure managers and maintenance suppliers potentially improving security of employment	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	248.377,5 km (20 Countries)
	Standards and rights related to job quality	9) Stable financial perspective, allowing more secure jobs, and also increasing staff satisfaction and job quality.	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	248.377,5 km (20 Countries)

Macro-category of impacts	Impacts on:	Identified impact	Unit of measure	Option A	Option B	Option C
Social	**Governance, participation, good administration**	10) Improved transparency to member states, taxpayers and other stakeholders regarding financing of infrastructures; public will be being informed about the use of any transfer from public money.	km of tracks & number of Countries	167.802,3 km (8 Countries)	167.802,3 km (8 Countries)	248.377,5 km (20 Countries)
Environmental	**Air quality**	11) Modal shift from other modes to rail is likely to be produced by the improvement of rail competitiveness.	tons NOx / year	- 5.075,9	- 5.075,9	- 5.699,7
			tons PM10 / year	- 101,4	- 101,4	- 113,9
	Climate		tons CO2 / year	- 502.947,1	- 502.947,1	- 564.759,6

It is important to highlight the difference between maintenance cost savings and additional administrative costs, in order to understand the likely effect of each options to the costs of infrastructure management after the implementation of multi-annual contracts.

The following tables give figures related to total impact on the infrastructure managers' annual operating[13] income and expenses; the impact remains positive in both options for the purchase of measurement trains presented in chapter 0., despite the hypothesis of transferring a significant part of the cost savings to the market in terms of infrastructure charges' reduction.

Table 6-2 – Total impact on infrastructure managers' income and expenses - Option: each MS buys its own measurement train

Values in Million Euro

	Option A	Option B	Option C
Maintenance cost savings (4a-4b-4c)	429,02	429,02	538,54
Savings allocated to reducing the charges	-261,33	-261,33	-282,52
Increase in revenues from infrastructure charges (because of additional traffic)[14]	26,34	26,34	28,02
IM administrative costs (management costs)	-12,21	-35,16	-35,16
Total	**181,82**	**158,87**	**248,88**

13 Capital costs for measurement trains' purchase are not included.

14 The estimate of the increase in revenues from infrastructure charges (because of additional traffic) takes into account the amount of rail additional traffic (whose values is estimated on the basis of the rail transport demand elasticity (values from literature) and the estimated rail service price reduction) and average values of freight train access charges (€/train-km, 2005 values from ECMT).

Table 6-3 - Total impact on infrastructure managers' income and expenses- Option: measurement trains shared among European infrastructure managers

Values in Million Euro

	Option A	Option B	Option C
Maintenance cost savings (4a-4b-4c)	429,02	429,02	538,54
Savings allocated to reducing the charges	-261,33	-261,33	-282,52
Increase in revenues from infrastructure charges (because of additional traffic)[15]	26,34	26,34	28,02
IM administrative costs (management costs)	-3,02	-4,75	-4,75
Total	**191,01**	**189,28**	**279,29**

6.1. Multi Criteria Analysis for the comparison of the Policy Options

A Multi Criteria Analysis (MCA) has been developed in order to allow the comparisons of the three policy options proposed and described in previous chapters. Key steps followed for the MCA of the three Policy Options have been:

– establishing criteria to be used to compare the options, both for quantitative and qualitative impacts (unite of measures and parameters for the estimate of different impacts);

– scoring how well each option meets the criteria: scores vary between 0 and 3 (where 3 corresponds to the most positive impact, or to the less negative in case of disadvantageous effects);

– assigning weights to each criterion to reflect its relative importance in the decision; the proposed weighting criteria have been decided on the basis of the consideration of the impact magnitude and of the significance of the impact within the context of the European policies (transport policy, social policies, etc);

– ranking the options by combining their relative weights and scores.

Table 6-4 shows the scoring of the single impacts for the three options and the relative weights, while **Table 6-5** provides the results of the analysis in terms of score of each option, calculated as the weighted average of the scoring of the single impacts.

[15] Same as previous footnote.

Option C gets the highest score; this result indicates the highest coherence of this option, compared to the others, to the objectives of multi annual contracts expressed in terms of the identified impacts.

Table 6-4 –Multi Criteria Analysis of the Policy Options

Identified impact	Unit of measure	Option A	Option B	Option C	SCORING			WEIGHT
					Option A	Option B	Option C	
Economic impacts (numbers 1-8)								
4a)infrastructure manager cost savings because of increased efficiency of the use of resources, in particular maintenance works scheduled more efficiently	Million Euro	257,0	257,0	337,1	2	2	3	1
4b)infrastructure manager cost savings because of increased efficiency in outsourcing maintenance activities	Million Euro	95,7	95,7	110,1	2	2	3	1
4c)infrastructure manager cost savings because of more advanced personnel reduction policies thanks to medium-term planning horizon	Million Euro	76,4	76,4	91,3	2	2	3	1
4d)infrastructure manager cost savings because of the possibility to avoid training costs in cause of use of unskilled resources	Total km of tracks of Countries experimenting the impact	163.104,3	163.104,3	243.679,5	2	2	3	0,25
4e) Additional (unplanned)infrastructure manager cost savings generated by incentives on managers (and possibly staff) on achieving the planned ones	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,3	248.377,5	1	1	3	0,25
3) Improvement of infrastructure quality (Reduction on n. derailments)	Reduction of n. derailments per million train km	-0,009	-0,036	-0,036	0	3	3	1
3) Improvement of infrastructure quality (% Increase in punctuality)	Increase in punctuality	+ 2,73%	+ 2,56%	+ 2,56%	2	3	3	1
	Impacted traffic (Million train km) (*)	1.291,5	1.776,5	1.776,5				
5) Cost for the theinfrastructure managers for the implementation of the system (investment costs)	Million Euro	222,7	583,3	583,3	3	1	1	0,75
5) Cost for theinfrastructure managers for the implementation of the system (management costs)	Million Euro / year	15,2	39,9	39,9	3	1	1	0,5
5) Cost for the regulatory bodies for specialised professional for monitoring and reporting and for the monitoring office	Million Euro / year	3,3	9,9	9,9	3	1	1	0,5
6a) Reduction of train price to the final users (passengers, shippers)	% price reduction	0,76%	0,76%	0,70%	1	1	3	1
	Impacted traffic (Million train km) (**)	2.361,3	2.361,3	3.972,6				
6b) Better quality and better availability of the service for final users	Total km of tracks of Countries experimenting the impact	167.802,2	229.287,5	229.287,5	2	3	3	0,5
1) Improved competitive position of rail transport	Total km of tracks of Countries experimenting the impact	167.802,2	167.802,2	248.377,5	2	2	3	0,5
2) Tendering of infrastructure management	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,2	229.287,5	2	2	3	0,25

Identified impact	Unit of measure	Option A	Option B	Option C	SCORING			WEIGHT
					Option A	Option B	Option C	
7) Costs savings can be used to reduce the State financial commitments	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,3	207.183,3	2	2	3	0,75
8) Social: More stable financial perspective both for infrastructure managers and maintenance suppliers potentially improving security of employment	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,3	248.377,5	2	2	3	0,5
9) Social: Stable financial perspective, allowing more secure jobs, and also increasing staff satisfaction and job quality	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,3	248.377,5	2	2	3	0,5
10) Social: Improved transparency to member states, taxpayers and other stakeholders regarding financing of infrastructures	Total km of tracks of Countries experimenting the impact	167.802,3	167.802,3	248.377,5	2	2	3	0,25
11) Environment: air pollution	NOx tons/y	-5.075,9	-5.075,9	-5.699,7	2	2	3	0,5
11) Environment: air pollution	PM10 tons/y	-101,4	-101,4	-113,9	2	2	3	0,5
11) Environment: climate	CO2 tons/y	-502.947,1	-502.947,1	-564.759,6	2	2	3	1

(*) The scores are based on the impact level (% of increase in punctuality) weighted by the impacted traffic.

(**)The scores are based on the impact level (% of price reduction) weighted by the impacted traffic.

Table 6-5 – Total scoring of the Policy Options

Final score	
Option A	25,50
Option B	26,50
Option C	37,00

On the basis of the results of the impact assessment and in order to perform the risk analysis, a sensitivity analysis has been carried out for some variables / parameters of the major positive impacts. The sensitivity analysis has been performed with the reference to Option C as proposed by the DG TREN. The results of quantitative assessment of Option C (see previous chapter) are considered as the base case. Parameters affecting the magnitude of the different identified impacts have been given a different value, in order to examine their effects on the impacts analysis results for Option C.

It is evident from the result of the sensitivity analysis that using in the analyses the minimum values (percentages) of cost savings resulting from the survey, gives as a result, values of costs savings between 20 % and around 70% lower than the base case (the total effect is a decrease in savings by 38%).

Besides the decrease in costs savings, the most significant variations in the results of the assessment are related to the indirect effects of maintenance costs reduction. An important result is also related to the impacts on traffic and the environment: the decrease of the threshold used for the estimate of costs savings gives, as a result, a reduction of NOx, PM10 and CO2 emissions (around 40% lower than in the base case).

7. MONITORING AND EVALUATION

The definition of a monitoring and evaluating system starts with the identification of the key indicators.

A set of core indicators relating to the main policy objectives are suggested as part of a monitoring system. The indicators have been identified according to the criteria adopted by the European Commission's impact assessment guidelines (the so-called “SMART” criteria): Specific, Measurable, Accepted (by staff, stakeholders), Realistic (closely related to the objectives to be reached) and time-dependent.

Furthermore, the selection of the proposed indicators have privileged indicators which are credible for non expert, unambiguous and easy to interpret; easy to monitor and robust against manipulation.

On consideration of the different objectives of the proposed policy options, indicators have been chosen in order to measure the impacts on “infrastructure” parameters (e.g. infrastructure quality) and the economic and financial aspects of the infrastructure management (e.g. infrastructure managers’ financial stability).

The proposed set of indicators shall be further specified according to ex-ante conditions of the specific networks and to choices by single Member States.

Case a) – Basic set of infrastructure quality and financial indicators

The basic set of indicators will include all quality and economy parameters that do not require sophisticated measurement tools (such as the measurement trains described in the chapter "administrative costs"). For the infrastructure quality, they represent the minimum requirements to verify the evolution of the infrastructure quality in terms of its impacts on the service ("perceived infrastructure quality"). All economic indicators are also included.

Infrastructure quality indicators

Punctuality	Causes for delays allocated to the infrastructure manager; Classification of causes of delays by kind of damage and / or kind of irregularity allocated on the different assets managed by the infrastructure manager; Possibility of grouping the causes of irregularities by line, region and single asset.
Speed restriction	Number and duration per type of line Theoretical or monitored journey time lost for speed restrictions
Unplanned service disruptions	Number and duration of disruptions (due to failure on the infrastructure, e.g. broken rails, broken signalling contact wires) per type of line
Age of specified facilities	
Traffic safety indicators	Number of accidents, incidents, deaths and injured people due to failure on the infrastructure Outcomes of litigations.

Financial indicators

Annual maintenance costs (or, better, costs related to duration of the planned maintenance cycle, e.g. infrastructure life cycle costs - LCC): per region and per line* per km of track and per train.km (ratios between line LCC and traffic over the life-cycle time span)	It should be taken into account the following parameters: Costs for renewals Duration of renewals cycles Unit costs for single maintenance work; Type of lines; Traffic entity; Future investments planned;

	Future dismissing of the line (in this case, lines whose dismissing is planned shall not be considered in the evaluation of the proposed financial indicators at network level, with preventive agreement between infrastructure manager and State)
Revenues from infrastructure charges	per region and per line total and per train.km
State subsidies	Disaggregation depends on how they are distributes (as a total mount, or per km of track or line, or per region etc.)
Financial stability ratios	annual rail charges' revenues / annual maintenance costs + renewal costs (to be transformed in annual costs according to the renewal cycles) for the whole network, as well as by region and (possibly) by line*
Overhead costs (%)	
Financial Efficiency Index	IMs total expenditure as the sum of operating costs and total expenditures on maintenance, adjusted for traffic patterns and network size, plus the total expenditure on plain line track renewals, normalised for the volume of tracks replaced
Financing – Debt to Regulatory Asset base (RAB) ratio	Measure of the infrastructure managers' financial indebtedness

* Availability of detailed cost data by line is suitable but it will require significant data collection and elaboration effort (especially for large networks), whereas network-vide data (or regional data in case of large networks) are the minimum dataset.

Case b) – Extended set of infrastructure quality indicators

Indicators for case b) will include all the indicators chosen for case a) plus further quality indicators based on train measurement parameters, such as:

- Voltage at pantograph for monitoring traction current supply reliability;
- Quality of the geometry of the overhead cable;
- Number of broken rails not due do a bad functioning of pantograph;
- Quality of the geometry of tracks;
- Number of malfunctioning due to buckling of the track, track gauge, track wear;
- Indicators of the quality of train running;
- Number of malfunctioning of signalling systems / Coverage of communication systems.

The specificity of the above proposed indicators (both the set and the set b) to the purpose of monitoring infrastructure management is evident (all directly concern the infrastructure quality and the infrastructure manager expenditures and revenues, that are the objects of the monitoring system).

The measurability of set b) indicators can be ensured by availability of the monitoring resources defined in the chapter on administrative costs. Measurement of infrastructure quality indicators of set a) does not require instead additional resources compared to the ones requires by the performance regimes and by the normal traffic monitoring.

As far as financial indicators are concerned, measurability is certainly ensured for network-wide data on maintenance and renewal costs, whereas many infrastructure managers probably still lack of continuous monitoring of such kind of data by regions or, even more, by line. Availability of detailed cost data will allow internal benchmarking and more precise monitoring of expenditures, as well as easier comparison between expenditure levels and quality levels. Simplified network-vide monitoring of maintenance and renewal costs can be a first step.

Concerning acceptability and realism, this shall be guaranteed by the target levels defined for each indicators, more than the by the definition of the indicator in itself.

Concerning the time definition, using indicators require the definition of appropriate monitoring and reporting frequency; for the financial indicators and the punctuality indicators, a monthly reporting is proposed including total values for the whole network in the previous month (to be compared with the agreed targets).

In the present report, the estimate of the impacts on infrastructure quality and costs, although based on more aggregated data than those necessary for the estimate of the proposed indicators, has provided percentages of improvement in the quality levels for each country. Such estimates can be used as a starting point for a more accurate analysis of initial conditions of single countries, in order to define improvement trends for every proposed indicator. The point in time when the quality criteria will be measured has to be previously agreed.

It must be mentioned here that the precise definition of rail infrastructure quality indicators and their desirable target value is one of the main goals of the EU project “Integrail”, funded with 11 M€ within the 6th Framework Programme for Research and Technological Development.