Study

Commissioned by:

Verband Deutscher Verkehrsunternehmen e. V.
[Association of German transport Companies]
Vereinigung der Privatgüterwagen-Interessenten
[Union of Private Freight Wagon Companies]
DB Schenker Rail GmbH
DB Netz AG
AAE Ahaus-Alstätter Eisenbahn Cargo AG
European Rail Freight Association
UIC International Union of Railways

Study to Determine the Transaction Costs of Different Incentive Models for Retrofitting the Freight Wagon Fleet with Composite Brake Blocks

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Summary

Produced by

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Content and Objective of the Study

The noise of rail traffic has received increasing attention from railways, industry, politics, associations and the people affected. While in the past most investment was put into noise protection measures on infrastructure and buildings (e.g. noise protection walls), new studies show that investment in noise protection on rolling stock is more efficient from a cost-benefit point of view. The main cause of rail freight traffic noise is cast iron brake blocks which roughen up the wheels. This leads to unevenness in the treads of the wheelsets and as a result to increased noise when running. With new types of composite brake blocks there are technical solutions available which can produce a significant reduction in the noise level of the wagon fleet.

At present different promotional programmes and incentive models are being discussed on the European and national state levels which aim to provide for a quick and comprehensive retrofitting of the complete wagon fleet. The range of models standing in the public domain extends from direct funding for retrofitting programmes through bonus models that depend on the distance wagons run to noise differentiated track access charge systems.

Based on their experience with the programme applied in Switzerland most sector players favour a direct grant for the retrofitting paid by the respective member state. Contrary, the European Commission thinks that a noise differentiated track access charge is the most suitable model as was clear from the 'Recast to the first railway package of the European Union', published in autumn 2010. In this document the possibility of noise differentiated track access charge was expressly mentioned. Representatives of the railway industry in Germany proposed an alternative concept at the beginning of 2010: A mileage related bonus for converted freight wagons paid directly to the wagon keepers.

To determine the transaction cost associated with these incentive models in case they where placed in operation the Verbands Deutscher Verkehrsunternehmen e.V. (VDV), [Association of German Transport Companies] the Vereinigung der Privatgüterwagen-Interessenten (VPI Hamburg), [Union of Private Freight Wagon Companies], Ahaus-Alstätter Eisenbahn Cargo AG (AAE), DB Netz AG, DB Schenker Rail GmbH, the European Rail Freight Association (ERFA) and the International Union of Railways (UIC) have commissioned this study.

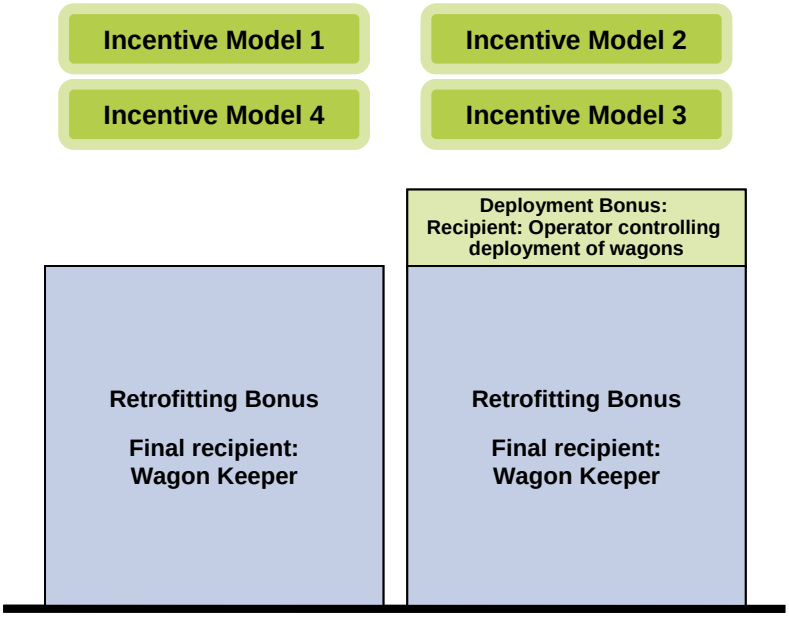
The following four models to support the retrofitting of freight wagons were investigated:

- Model 1: Mileage and noise dependent Bonus scheme (below referred to as 'ND Bonus Model');
- Model 2: Noise differentiated track access charge system discriminating charges by time of the day and by route on the basis of IT operating systems (below referred to as 'NDTAC-IT Model');

- Model 3: Noise differentiated track access charge scheme discriminating charges by time of the day and by route on the basis of RFID-technology (below referred to as 'NDTAC-RFID Model'); and
- Model 4: Direct funding.

The mileage and noise differentiated bonus model and the direct funding (Model 1 and Model 4) solely aim at retrofitting rail freight wagons with composite brake blocks. Both noise differentiated track access charge schemes (Model 2 and 3) include an additional incentive element which aims at deploying wagons in a manner at which noise exposure of affected communities is reduced.

Types of Bonuses in the Incentive Models Investigated



Source: KCW

It was assumed for all models that the duration of the programme would be eight years. The choice of the four models was specified by the client of the study and was based on the incentive models discussed by Working Group 3 of the 'Silent Rhine' project. In so far as these models had not been defined in detail in the public discussion presentation, their design was largely laid down by the client. The development of additional (as well as the optimising of the considered) incentive models was not part of this study.

Mileage and noise differentiated bonus model

The mileage and noise differentiated bonus model was put forward at the beginning of 2010 by a wide group of players (VDV, VPI Hamburg, DB SR, DB

Netz) into public discussion. Aim of the model is the incentivation of concerned market players to secure a quick and comprehensive retrofitting of the freight wagon fleet with composite brake blocks. Wagon keepers receive a bonus for each retrofitted wagon of their fleet dependent on its annual mileage (run on the German rail network) and number of axles.

The incentive scheme is funded by the public sector; the bonus is paid directly by the 'Public Bonus Office' to the Wagon Keeper - bypassing the business relationship Railway Undertaking - Infrastructure Manager , which is the most relevant with regard to access charge payments, or other possible stages of invoicing between stakeholders.

The model uses the existing contractual relationships and information obligations regulated in the 'General Contract of Use of Wagons' (GCU) which is applied throughout Europe. The contract states that RUs have to report annual mileage data to all respective Wagon Keepers. It further regulates the way in which technical specifications of each wagon have to be recorded in the 'National Vehicle Register'.

The incentive model is designed as a temporary model for a period of eight years. However, the bonus period of a wagon can be ended earlier if the bonus ceiling is reached before the end of the eight years. Once the programme is finished no further bonuses can be claimed.

Noise Differentiated Track Access Charge System (NDTAC)

The NDTAC for quiet/loud freight wagons aims in the same way as the mileage and noise differentiated bonus model at incentivising market players to retrofit freight wagons. Furthermore it includes an additional incentive element which aims at deploying wagons in a manner at which noise exposure of affected communities is reduced. The basic idea is that noise differentiated track access charge should be applied permanently and the technology to achieve it left open.

Three variants of the NDTAC are examined:

- A pure bonus system for quiet freight wagons (NDTAC-bonus);
- A bonus-penalty system in which bonuses are paid for quiet wagons and penalties charged for loud freight wagons, calculated on a wagon-specific base per wagon (NDTAC- bonus-penalty); and
- A bonus-penalty system, in which the bonuses are calculated on a wagon specific base, the penalties are only levied indirectly and not for each wagon, but in the form of a general increase of access charges for freight trains (NADTC-TAC-rise).

While the public sector would fund the NDTAC- bonus scheme, the second and third variant is funded by the rail sector itself.

In a first invoicing stage bonuses and penalties are paid between IM and RU, regardless whether or not the bonus includes the incentive element 'deployment of wagons' or not. In a second step both, bonuses and penalties have to be forwarded to downstream market players in a way that:

- the 'retrofitting bonus' per wagon is determined by the RU by means of the invoicing process with the IM as well as from the data generated by the internal production system of the RU, and then transferred to the wagon keeper (in case the RU is not the wagon keeper). Since there isn't a direct relation between RU and wagon keeper in every case, intermediate players (e.g. other RUs, operators and consignors) should, if necessary, be included as 'transit players'; and
- the 'deployment bonus needs to be transferred to an operator or consignor.

Noise Differentiated Track Access Charge System on the Basis of RFID

The RFID based noise related track access charge system corresponds in essence to the NDTAC model described above. It is also examined in three different variants (pure bonus system, bonus-penalty system, Bonus system with general increase of the track access charges). The main difference between NDTAC and NDTAC- RFID is the recording of trains and wagons by means of RFID portals along the track. Hence all wagons entitled to receive a bonus or obliged to pay a penalty have to be equipped with RFID-chip. This applies as well for non-German freight wagons.

Direct Funding

In the direct funding scheme the wagon keeper receives a grant from a public sector entity to retrofit his wagons with composite brake blocks. This applies to all German wagons, but may also be extended to foreign wagons. Consequently only the wagon keepers and the public sector entity which is granting the bonus – the 'public Bonus Office' (most likely the EBA) participate in this model. The extent of funds received is not subject to the annual mileage of the respective mileage.

Direct support is considered by many representatives of the railway sectors as the most suitable model for the fast retrofitting of freight wagons. In Switzerland, it was possible to convert the freight wagon fleet in a quick and comprehensive manner.

Methodology and Assumptions

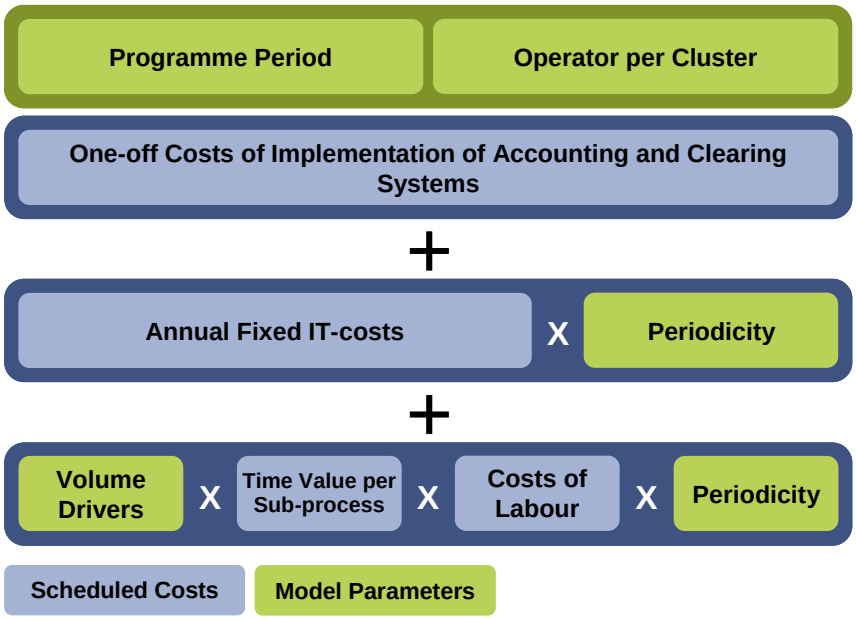
The following methodology was used to quantify the transaction costs in the incentive models: In a firsts step interviews with industry experts where

undertaken to determine existing business relationships and associated business procedures (especially IT) between the relevant stakeholders as well as the administrative cost involved.

In a second step those business processes and subsequent administrative efforts which would arise from the introduction of each of the above mentioned incentive models where established.

To determine the transaction costs an analytical cost model was developed in which all basic assumptions and quantity structures were put in that could be derived from personal assessment, interviews, discussions and available sources. The complete process of cost calculation was carried out in five phases: In the first phase the additional business processes necessary for all models are investigated and were identified. In the second phase partial processes were worked out, standardised and assigned to the respective players. In the third phase the cost parameters necessary for the calculation of the transaction costs, as well as the quantity drivers, were determined and put into the cost model. Finally, the transaction costs arising were calculated with the help of the model and a sensitivity test carried out for all cost parameters.

Components of the Analytical Cost Model



Source: KCW

Results

Mileage and Noise Differentiated Bonus Model

For the mileage and noise differentiated bonus model (ND-Bonus) transaction costs of 81 million Euro were determined (over an eight year programme period). It has the lowest transaction costs of all mileage-related incentive models which have been investigated as part of this study. The retrofitting incentive acts directly on the wagon keeper, thus the player who carries the financial risk of the retrofitting. As a result there is a comparatively high incentive effect with regard to the incentive target (fast and comprehensive retrofitting). Hence, in relation to transaction costs public funds are spend very effectively.

Noise Differentiated Track Access Charge Models

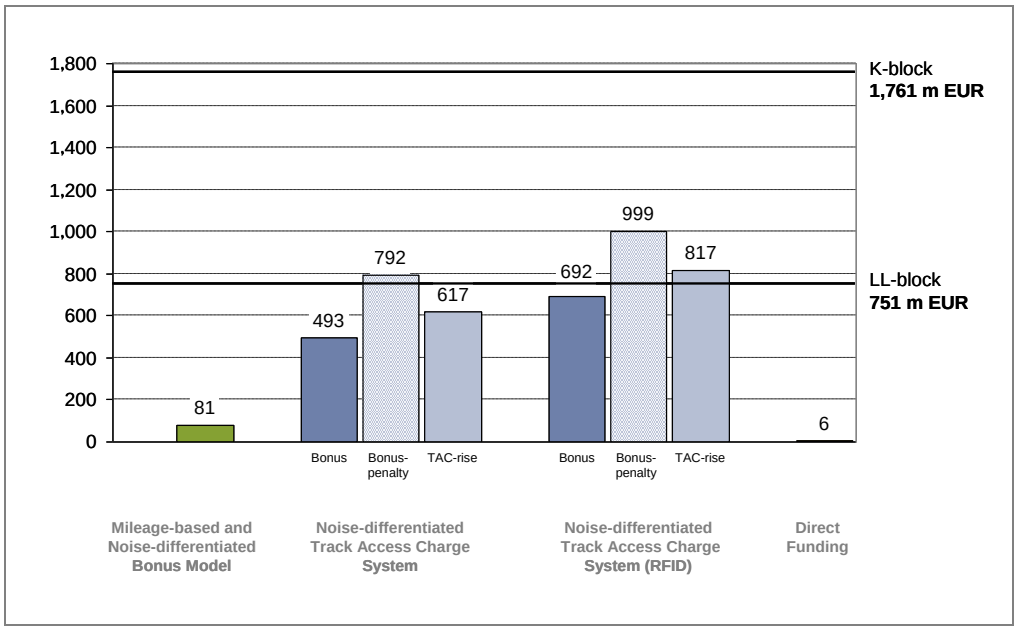
The noise differentiated track access charge systems, both with and without RFID, are in contrast, more expensive and depending on the refinancing – by sector or public funds – accompanied by different negative market effects. Furthermore their feasibility appears problematic, since particularly the aim of traffic control is hardly convertible in view of the market structure. In the most favourable variant as a pure bonus model and without RFID recording of the trains the complete transaction cost is calculated at about EUR 493 million. A noise differentiated track access charging system with RFID recording of trains by means of RFID portals on the line and RFID chips on the freight wagons would bring with it almost a EUR one billion price tag just in transaction costs for the bonus-penalty variant.

Direct Funding

The lowest transaction costs of all models were determined for the Direct Funding scheme. However, as funding of wagons is not related to their annual mileage the incentive effect is estimated to be lower than in the ND-Bonus Model.

The below figure demonstrates the transaction costs of the four cost models (including sub-variants for the noise related track access charge systems) compared with one another as well as in relation to the total retrofitting cost for the entire fleet.

Cumulative Transaction Costs Determined for the four Incentive Models Investigated (EUR million over a 8 year programme period)



Source: KCW's figures on the basis of the cost calculation and data from client

Estimation of Transaction Costs when Implementing the Incentive Models in other European Countries

In addition to the detailed investigation for the German market, an estimate was made for certain selected European Countries using simplified analogous decisions. The work was based on similar standard model arrangements in the different countries. This showed that by applying the noise differentiated track access charging models (without RFID) to the selected European States (including Germany), depending on the variant chosen (bonus, bonus-penalty, increased track access charges), the total cost in the complete programme time would be about EUR 2.3 to 4.7 billion. In the noise differentiated track access charging models with RFID recording the sum expected over the period of the programme was about EUR 3.3 to 5.8 billion. In the mileage and noise differentiated bonus model on the other hand for the 17 countries considered there were likely transaction costs of between EUR 400 and 500 million in eight years.

Conclusion

Starting from the transaction costs and the qualitative assessment of the incentive models the mileage and noise differentiated bonus model is best suited to achieve the objectives of noise reduction as a result of a fast retrofitting of freight wagons to silent brake blocks. There are starting points for further development for all the incentive models investigated in order to

optimise their feasability, effectiveness and transaction costs. In particular all incentive models allow combined funding from the public authorities and the railway sector in order to be able to take suitable account of the budgetary policy requirements of the public authorities.

The following table summarises the findings of the qualitative assessment of the examined incentive models.

Qualitative Assessment of the Incentive Models Investigated

	ND Bonus Model	NDTAC-IT Bonus Model	NDTAC-IT Bonus-penalty Model	NDTAC-IT TAC-rise Model	NDTAC-RFID Bonus Model	NDTAC-RFID Bonus-penalty Model	NDTAC-RFID TAC-rise Model	Direct Funding Scheme
Incentive Effect	very good	medium	medium	medium	good	very good	good	very good
Feasibility/ Practicability	very good	medium	very poor	poor	poor	very poor	very poor	very good
Negative Impact on Rail Freight Market	very poor	medium	very high	very high	medium	very high	very high	verry poor
Level of Transaction Costs Imposed	very effective	In part effective	ineffective	In part effective	very ineffective	very ineffective	very ineffective	effective

Source: KCW