

## The NDTAC scheme:

# Assessing the ROI and incentive for retrofitting rail freight wagons as a result of noise abatement strategies

As controlling the levels of railway transportation noise continues to be a hot topic for the industry, **Maria Price**, Head of European Policies and Public Affairs at the International Union of Wagon Keepers (UIP) and **Markus Vaerst**, Acting Secretary General of the European Rail Freight Association (ERFA), reflect on recent policies in this area. They also assess whether the Noise Differentiated Track Access Charges (NDTAC) scheme is raising more concerns than support towards railway noise reduction.

Noise in rail transportation has been high on the political agenda for the European Union and some Member States as it is considered the second most dominant challenge after air pollution. Societal pressures regarding high noise receptions caused by rail have led to politicians in some Member States demanding actions at national and European levels. As a consequence the European Commission (EC) has introduced a series of policies and measures over the years.

In 1996 the EC raised its concerns regarding noise derived from all modes of transport and the existing opposition for expansion of rail infrastructure due to noise (COM (96) 540). Proposals were made for noise limits, a harmonised method for assessment approach, and economic instruments such as track access charges.

In 2002 the Environmental Noise Directive (END) 2002/49/EC required Member States to submit noise maps and action plans for transport and large agglomerations and to assess the exposure to noise throughout Europe. The END does not define any noise limit values, nor does it prescribe concrete measures that should be used in these action plans. Furthermore, it does not set a legal framework and timeframes for implementation of these plans. As a consequence diverging pathways and approaches are being pursued at both European and national levels.

In 2003 the European Commission paper on *European Strategies and Priorities for Railway Noise Abatement* confirmed that the three

major sources for railway noise are freight wagons, high-speed trains and urban railways. Furthermore, the noise is identified as rolling noise (i.e. wheel-track interaction particularly at speeds above 200km/h), traction and auxiliary systems, and aerodynamic noise (for passenger trains when speed is around or higher than 250km/h).

Technical considerations towards noise reduction in rail transportation were taken through the Interoperability Directive 2008/57/EC (EC, 2008) and the Noise Technical Specifications for Interoperability (Noise TSI). The Noise TSI requires that newly-built and upgraded freight wagons (and locomotives) since 2006 must meet certain noise emission limits. This could be achieved using Composite Brake Blocks (K or LL) instead of Cast Iron Brake Blocks or by equipping freight wagons with disc-brakes.

As a new attempt, and in following the objectives of the White Paper 2011 Roadmap to a Single European Transport Area (COM/2011/0144 final), the EC proposed the EU Noise Abatement Strategy. This also meant that under the Recast of the First Railway Package the EC introduced the concept of the Noise Differentiated Track Access Charges (NDTAC) scheme. As a consequence, in 2015 it adopted the Commission Implementing Regulation (EU) 2015/429 "setting out the modalities to be followed for the application of the charging for the cost of noise effects" which entered into force on 16 June 2015 and shall be applied until 31 December 2021 (EC, 2015).

**Table 1:** The retrofitting benchmarking exercise looked at wagons running on RFC1 and their different mileage requirements

Country	km on network	Bonus per 4-axle wagon-km (€)	Mileage run per year (km)			Cost of Retrofitting 4-axle wagon (Cr) (€)	Operational Costs (€) (Co) p.a.		
			40,000	80,000	120,000		40,000km	80,000km	120,000km
NL	182	0,040	6,154	12,308	18,462	1,700	800	1,600	2,400
DE	623	0,020	21,065	42,130	63,195				
CH	308	0,070	10,414	20,828	31,243				
IT	70	0,000	2,367	4,734	7,101				
<b>Total</b>	<b>1,183</b>		<b>40,000</b>	<b>80,000</b>	<b>120,000</b>				

The objective for the NDTAC scheme is to create an incentive towards noise reduction, including the retrofitting of rail freight wagons with composite brake blocks. This objective, although well intended, is in reality raising more concerns and questions on its feasibility and economic added value. The NDTAC scheme is a charging (bonus/malus) arrangement between Infrastructure Managers (IMs) and Railway Undertakings (RUs). However, the retrofitting of freight wagons is usually the responsibility of a Wagon Keeper (WK) or rolling stock owner. Therefore, one could see a paradigm where, while a charging scheme is arranged between two parties (IM/RU), a third one is burdened with additional costs without a guarantee for a full or partial return of its investments. Such concerns provoked the need to assess the cost impact of the NDTAC scheme on the investments towards retrofitting and maintenance of rail freight wagons.

It should be noted that, so far, only Germany, the Netherlands and Switzerland (who is a non-EU Member State) have introduced the NDTAC scheme and have defined a national legislative framework to provide financing and incentives to promote the retrofitting of the existing wagons fleet. Bearing in mind that rail freight transport is mostly cross border traffic, the authors chose to assess the impact on investment for wagons that operate internationally and, as a result, have to consider different noise requirements or NDTAC schemes (where such are in place) in every country they run. Therefore, the benchmarking methodology focuses on a case study of the Rhine-Alpine Corridor (Rotterdam–Genoa) which is one of the major rail freight corridors of the Trans-European Rail network crossing the Netherlands, Germany, Switzerland and Italy (shown as 'RFC1' in **Figure 1** on page 6).

The German implementation of the NDTAC scheme started on 9 December 2012 and will end on 8 December 2020. Compensation of costs for retrofitting is paid by the national government but limited to €211 per axle. The direct beneficiary is the WK. A particular challenge is the precondition on the provision of evidence and justification on run-mileage data of German infrastructure (DB Netz). Mileage data should be provided from the RU which operates the wagons in its trains, to the WK. However, in practice such data is not readily available in all cases. When not provided the bonus cannot be claimed and thus awarded, leaving the WK with the full costs. It should also be noted that higher operational/maintenance costs (such as wheel wear) caused by the use of composite brake blocks are not considered in the German NDTAC system.

In the Netherlands the national government pays a maximum of €4,800 per retrofitted wagon. The direct beneficiary is the RU and the compensation is paid for wagons operated on the Dutch infrastructure network only. As the WK is not the direct beneficiary, contractual agreements between the RU and the WK must be concluded in order to enable the transfer of the bonus received by the RU. The scheme is applied until 2017 but may be extended.

Unlike in Germany and the Netherlands, the Swiss government has committed 100% payment of compensation for costs for retrofitting of wagons with K brake blocks. This applied only to wagons that have been registered in the Swiss National Vehicle Register (NVR) by 2001. Almost 100% of the Swiss fleet (approximately 15,000 wagons) was fully-retrofitted by 2015. In addition to the 100% reimbursement of retrofitting costs, the Swiss NDTAC scheme foresees a compensation for higher operational costs for all TSI Noise compliant wagons.



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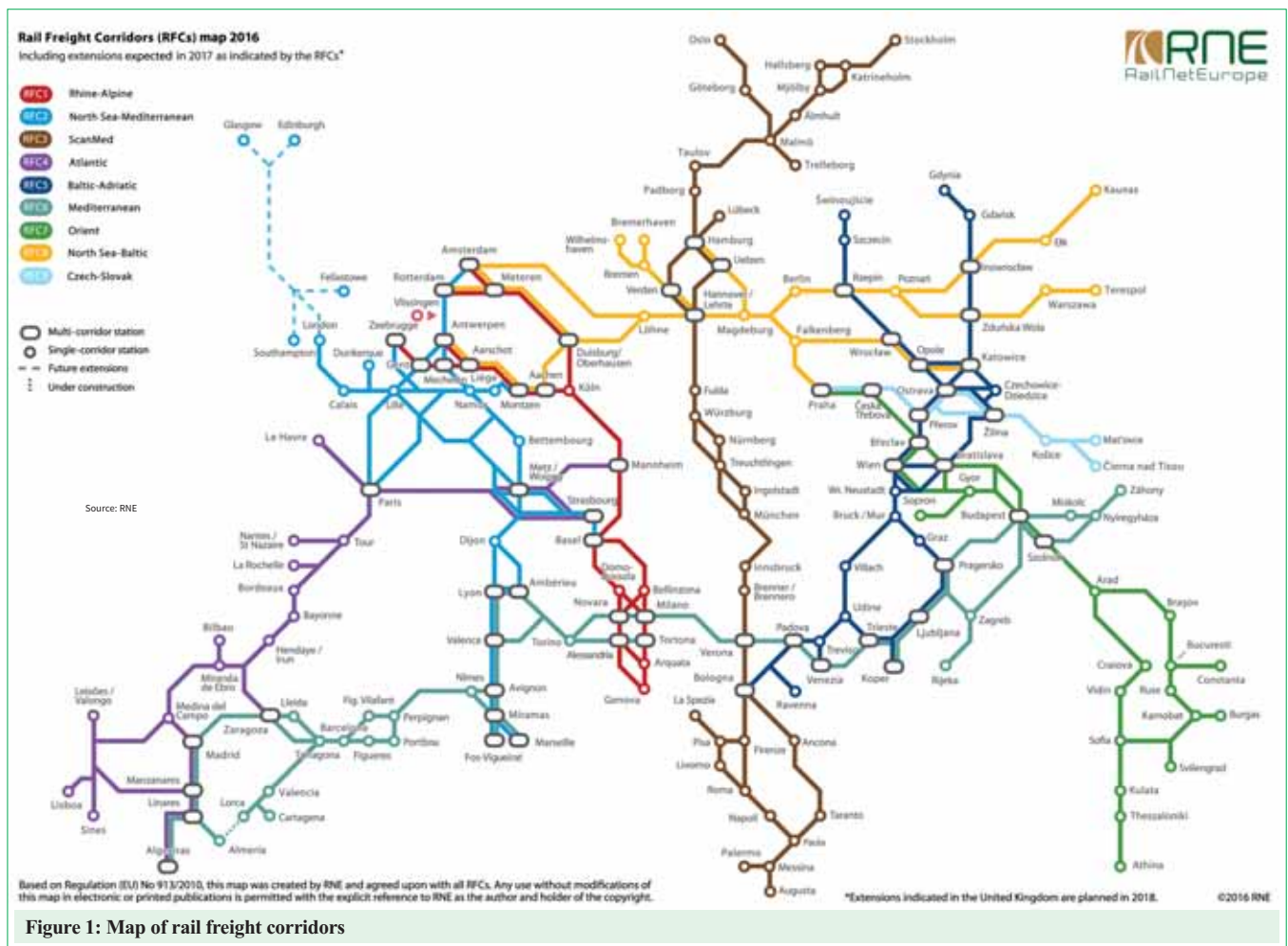


Figure 1: Map of rail freight corridors

The compensation (bonus) may be claimed by the operating RU. Similarly in the Netherlands, a contractual agreement between the RU and the WK must be concluded in order to enable the transfer of the bonus received by the RU.

Italy is still in the early stages of internal discussions and in the process of determining the most appropriate NDTAC scheme according to the Regulation.

Assessing the number of wagons in service and deriving the return on investment from the retrofitting with composite brake blocks is an important element in the strategy of every WK when determining how well its fleet will develop and be utilised by the customers in the future;

the question is whether the NDTAC measures presented so far provide an economic advantage to the WK as an investor.

With regards to retrofitting, what is known is that from 2006 onwards any new or upgraded wagons have to meet the provisions of the TSI Noise. Wagons that are built before 2006 are expected to be retrofitted with composite brake blocks (preferably LL). The average use or lifecycle of a wagon is between 30 and 36 years.

For the benchmarking exercise it is assumed that the wagon runs along the defined Corridor 1 for eight years. In the case of the Netherlands, the bonus limit may be reached before the expiration of the eighth year because its existing NDTAC system extends to four

Table 2: Scenario 1 looked at wagons running 40,000km per annum in the Rotterdam–Genoa corridor

Scenario 1 40,000km p.a.	Bonus year 1	Bonus year 2	Bonus year 3	Bonus year 4	Bonus year 5	Bonus year 6	Bonus year 7	Bonus year 8	Total
NL	246	246	246	246	0	0	0	0	985
DE	421	421	2	0	0	0	0	0	845
CH	708	708	708	708	708	708	708	708	5665
IT	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1376</b>	<b>1376</b>	<b>956</b>	<b>954</b>	<b>708</b>	<b>708</b>	<b>708</b>	<b>708</b>	<b>7495</b>
Co	800	800	800	800	800	800	800	800	6400
Bonus – Co	576	576	156	154	-92	-92	-92	-92	
Cumulated Bonus – Co	576	1151	1308	1462	1370	1278	1186	1095	
Cr									1700
(Cumulated Bonus – Co) – Cr									-605



Table 3: Scenario 2 looked at wagons running 80,000km per annum in the Rotterdam–Genoa corridor

Scenario 2 80,000km p.a.	Bonus year 1	Bonus year 2	Bonus year 3	Bonus year 4	Bonus year 5	Bonus year 6	Bonus year 7	Bonus year 8	Total
NL	492	492	492	492	0	0	0	0	1969
DE	843	1	0	0	0	0	0	0	844
CH	1416	1416	1416	1416	1416	1416	1416	1416	11331
IT	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>2751</b>	<b>1910</b>	<b>1909</b>	<b>1909</b>	<b>1416</b>	<b>1416</b>	<b>1416</b>	<b>1416</b>	<b>14143</b>
Co	1600	1600	1600	1600	1600	1600	1600	1600	12800
Bonus – Co	1151	310	309	309	-184	-184	-184	-184	
Cumulated Bonus – Co	1151	1461	1770	2078	1894	1711	1527	1343	
Cr									1700
(Cumulated Bonus – Co) – Cr									-375

years only. This would mean that there will be no bonus awards after the four years. Administrative costs related to the WK's claim processes and procedures are not included. However, under the bonus-malus NDTAC scheme, the process will normally involve different actors and thus will require not only IT tools, but also a process and staff to handle the claims, respectively. It can therefore be assumed that there will be additional administrative cost burdens to all actors involved.

With regard to costs, only the investment costs derived from retrofitting and operations of rail freight wagons versus the bonus awarded by each country are considered. A zero or positive balance would mean that the bonus contributes to these investments. A negative balance would indicate that there has not been a return of investment. The average cost for retrofitting of a four axel wagon (Cr) amounts to €1,700 per wagon. The estimated additional operational

cost following the retrofitting (Co) is €0,005 per axle/km. This means that the operational – and associated maintenance – cost increase correlates directly with the mileage. Mileage-run is also an important variable, not only for the decision if and when to retrofit but also for claiming of the bonus. For example, in order to receive the full bonus of €211 per axle/km under the German NDTAC, the wagon has to run (only) 48,000km in total on the German infrastructure from 2012 until 2020. In the Netherlands, in order to be awarded €4,800, the wagon has to operate 120,000km on the Dutch infrastructure in the four-year duration of the NDTAC scheme. Due to the different mileage requirements, the benchmarking exercise looks at three scenarios: a wagon that runs 40,000km; 80,000km; and 120,000km per annum.

The results show that on this specific Rotterdam–Genoa rail freight corridor, in all scenarios only wagons passing via Switzerland would

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**Table 4:** Scenario 3 looked at wagons running 1200,000km per annum in the Rotterdam–Genoa corridor

Scenario 3 120,000km p.a.	Bonus year 1	Bonus year 2	Bonus year 3	Bonus year 4	Bonus year 5	Bonus year 6	Bonus year 7	Bonus year 8	Total
NL	738	738	738	738	0	0	0	0	2954
DE	844	0	0	0	0	0	0	0	844
CH	2124	2124	2124	2124	2124	2124	2124	2124	16996
IT	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3707</b>	<b>2863</b>	<b>2863</b>	<b>2863</b>	<b>2124</b>	<b>2124</b>	<b>2124</b>	<b>2124</b>	<b>20794</b>
Co	2400	2400	2400	2400	2400	2400	2400	2400	19200
Bonus – Co	1307	463	463	463	-276	-276	-276	-276	
Cumulated Bonus – Co	1307	1770	2233	2696	2420	2145	1869	1594	
Cr									1700
(Cumulated Bonus – Co) – Cr									-106

have a positive return on investment when taking into account not only the one-off costs for retrofitting with LL brake blocks, but also the additional maintenance/operational costs caused by the usage of these brake blocks.

In Scenario 1 (Table 2 on page 6) where the wagon runs 40,000km per annum on the Rotterdam–Genoa corridor, there is no return on investment for both the retrofitting and additional operational costs. However, the least amount of losses will be seen in year four of the application of the bonus period. This is especially favourable for the Netherlands because the latter will not be able to offer a bonus after year four (unless the validity of the scheme is extended).

In Scenario 2 (Table 3 on page 7) where the wagon runs 80,000km on the Rotterdam–Genoa corridor, a positive return on investment and operational cost is seen between year three and year six of the bonus period.

In Scenario 3 (Table 4) where the wagon runs 120,000km on the Rotterdam–Genoa corridor, a positive return on investment for operational costs can be seen between year two and year seven.

It can be concluded that, from an investment and economic point-of-view, it makes sense to retrofit wagons with composite brake blocks provided the wagons are circulating in the Netherlands and Switzerland. If wagons are solely operating in Germany, the German NDTAC is not sufficient to support the retrofitting and operational costs. Obviously, for wagons that operate in a country that does not have a scheme or a subsidy plan (such as Italy on Corridor 1) there is no return on investment at all.

Furthermore, the fact that the NDTAC system is an arrangement between RUs and IMs means that it is wrong to assume that the WK, as a third party, will be guaranteed the transfer of bonus awarded to the RU, unless there is a legal obligation by the RU and the IM to do so. As a consequence, this is likely to create further setbacks to the transportation of goods by rail, which in turn will have a negative impact on rail freight services, distorting competition and losing out against other modes of transport, in particular road transportation. In addition, there might be the risk of discrimination for pure WKs compared to cases where the operating RU is identical to the WK – a situation that mainly and often applies for the former state-owned RUs. Therefore, the existing NDTAC schemes are not a sufficient incentive for retrofitting freight wagons and other financial compensation/ supporting measures need to be considered.

Proposals to set-up a ‘new build versus old wagon scrapping compensation scheme’ are likely to positively contribute towards partial funding of the purchase cost for new-build wagons, while simultaneously allowing time for older wagons (equipped with cast iron brake blocks) to be scrapped. Such a system can be an economical solution and should provide not only an incentive towards noise reduction, but reduce the administrative burdens to the WK (as ‘investor’).

Finally, if a ban date for wagons equipped with cast iron brake blocks is put in place, granting initial subsidies through direct financing would be the most logical and pragmatic solution going forward. Most likely it will boost the investment in retrofitting and facilitate the burden of the WK to retrofit in a very short timeframe. This may explain the success in Switzerland who, through direct financing, managed to retrofit its fleet by 2015. 🇨🇭



**Maria Price** holds a Doctorate Degree from the University of Oxford (St Anne’s College), Transport Studies Unit, School of Geography and Environment. She has been working for the past 11 years on a variety of rail topics including TEN-T development; the Fourth Railway Package; safety and interoperability; standardisation; TAF/TAP and Registers; NOISE; digitalisation; combined transport; wagon load services; EU funding; EU project calls; rail market monitoring; railway indicators; statistics; economic evaluation; and research and innovation. Maria is currently Head of European Policies and Public Affairs at the International Union of Wagon Keepers (UIP) where she participates in numerous working and expert groups and deals with relations with the European Commission; European Parliament; the European Union Agency for Railways; sector stakeholders; and the media. Previously Maria worked at the European Commission (Unit Intermodality and Logistics); VIADOONAU (a BMVIT Development Agency for Inland Waterways in Vienna, Austria); and in commercial vehicle procurement (department for build and delivery) in the UK.

**Markus Vaerst** holds a degree in Economic Sciences from the University in Frankfurt am Main. Until September 2013 he was working in various areas at top-level management positions such as Director of Operations, COO and Director of Engineering, Regulatory and Associations for AAE Holding AG (Switzerland) – formerly one of the largest European freight wagon leasing companies and serving as licensed Railway Undertaking and Infrastructure Manager Company. At the end of 2013 Markus founded his own company, Railmind GmbH, providing consulting services to companies and associations that are active in the field of European rail freight operation. He also works on rail freight related issues such as liberalisation, safety, interoperability, noise, and participates in numerous working groups at national and European level. Markus is currently Acting Secretary General of the European Rail Freight Association (ERFA).

