

inter.noise 2000

*The 29th International Congress and Exhibition on Noise Control Engineering
27-30 August 2000, Nice, FRANCE*

I-INCE Classification: 8.2

STRATEGIES OF THE GERMAN GOVERNMENT FOR THE REDUCTION OF RAILWAY NOISE AND THEIR EUROPEAN CONTEXT

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Keywords:

RAILWAY NOISE, NOISE EMISSION REGULATION, NOISE ABATEMENT PROGRAMME, GERMAN GOVERNMENT

ABSTRACT

The impairment of the population by noise along the older railway lines is one of the major environmental problems of the German and other European railways. In order to solve this problem the German government launched a noise abatement program for existing railway lines. The details of the programme and complementing strategies (noise emission regulation, emission-related track charges) are explained. The national strategies are related to the new European railway noise policy and the tasks of the new Working Group Railway noise are described.

1 - INTRODUCTION

In recent years the abatement of railway noise has gained more attention, in Germany as well as in the European Union. New technologies for railway noise reduction have been developed and there is an increased discussion about economic and legal instruments for railway noise abatement. The European Commission installed a Working Group on railway noise in December 1999. Likewise in 1999, the German government launched a railway noise abatement programme for older railway lines. Thus the short term target – the reduction of noise impacts hazardous to health – might hopefully be reached in the near future.

2 - RAILWAY NOISE ABATEMENT IN GERMANY

Current calculations of the German Federal Environmental Agency (Umweltbundesamt) show that in Germany in 1997 about 10 % of the population by night and 3 % by day was exposed to rail transport noise levels which may cause health risks (equivalent continuous sound pressure levels L_{Aeq} above 55 dB(A) by night and 65 dB(A) by day). The dominant source is night-time rail freight transport with cast-iron block braked wagons, accounting for 62 % of night-time exposure.

Noise is the major cause of opposition from the community to new railway lines or increased rail transport thus putting at risk the desirable shift from road to rail traffic.

To tackle the railway noise problem the German government has launched various activities: In late 1999 a **noise abatement programme for existing lines** was introduced (for federal roads a similar programme started as early as 22 years ago!):

- The budget of the programme is 100 million DM or about 50 million Euros/year) (for noise abatement on federal roads 1260 million DM have already been spent).
- The aim of the programme is to reduce impacts of rating levels (L_{Aeq} minus the rail bonus of 5 dB(A)) above 70 dB(A)/60 dB(A) by day/night for residential areas (the same targets as for federal roads).
- The German Ministry of Transport which is responsible for the programme has published a first priority list for rail transport noise abatement. The highest priority is given to measures to reduce the highest levels of exposure of the largest number of people.

- The following measures are financed under the programme:
 - Noise barriers and sound attenuating windows
 - Acoustically optimised rail grinding (achieving a reduction of 3 dB(A) compared with the average condition of rail surfaces when used by vehicles with smooth wheel surfaces)

Both the Ministry of Transport and the Ministry for the Environment wanted to include the financing of retrofitting measures for freight vehicles (substitution of the cast-iron brake blocks by composite blocks, with a reduction of about 8 dB(A)), similar to the Swiss noise remediation programme, but the Ministry of Finance has rejected this so far.

In addition the German government plans to introduce statutory noise exposure limits for existing roads and railway lines. The Umweltbundesamt has proposed exposure limits by which health risks due to noise could be avoided (rating levels of 55 dB(A) by night and 65 dB(A) by day).

Recently there has been some progress in the reduction of noise emissions from railbound vehicles:

- **The ICE passenger wagon** of the Deutsche Bahn AG is the quietest passenger wagon in Germany and perhaps in Europe. Its emissions are 18 dB(A) lower than those of cast-iron block braked and still 5 dB(A) lower than those of other disc braked passenger wagons (see Table 1, nos. 3, 4, 5) due to the use of wheel absorbers.
- The "**Low Noise (Freight) Train**" prototype, a joint development of the Austrian, German and Italian railways, is about 19 dB(A) quieter than a conventional freight wagon (see Table 1, nos. 6 and 12).
(Measures: disc brakes, bogie skirts combined with low barriers, etc)
- The use of **composite brake blocks** and **wheel absorbers** for freight wagons would lead to a reduction of about 10 dB(A) for the most critical vehicle category. However, composite blocks have not yet been internationally approved; approval is expected for the autumn of this year.

However, in Germany low-noise vehicles so far have mainly been developed for railway lines that are subject to noise exposure limits, due to the absence of noise regulations for railbound vehicles and the normally higher purchase price of these versions.

The German government has therefore launched a new initiative to draft a noise emission regulation for railbound vehicles and has requested the European Commission to take corresponding actions. In a research project proposals for ambitious noise limits have been made (see Table 1, nos. 8, 9, 10, 11) as well as suggestions for type testing and test track specifications. The Umweltbundesamt is currently drafting a national noise emission regulation although the German government would prefer a European regulation.

	No.	Vehicle Category	L_{AFmax} in dB(A) 7,5m: 80 km/h
Status quo	1	Diesel locomotive with cast iron block brakes	95
	2	ICE traction head	81
	3	passenger wagon with cast iron block brakes	95
	4	passenger wagon with disc brakes	82
	5	ICE passenger wagon	77
	6	freight wagon with cast iron block brakes	93
	7	railcars for urban transport	80
Limit proposals	8	locomotives	81
	9	Railcars, powered vehicles	79
	10	passenger wagons	76
	11	freight wagons	81
Prototype	12	Low-noise freight wagon	74

Table 1: Noise emissions from railbound vehicles, status quo and limit proposals.

With the increasing division of European railway companies into infrastructure and service undertakings there is a growing risk that the noise abatement measures chosen are not the optimal solution from an economic perspective (e.g. barriers and windows instead of vehicle- or track-related measures). Economic incentives like **emission-related track charges** can then encourage infrastructure and service undertakings to work together to find the optimal solutions. Noise emission-related track charges could also stimulate the use of low-noise railbound vehicles **before** the enforcement of emission limits and by companies which are not subject to those regulations.

With the Railway Infrastructure Use Ordinance of 1997 the German government authorizes the German infrastructure undertaking, the Deutsche Bahn Netz (network), to apply environmental criteria for the determination of track charges. Though the new track charge system of the Deutsche Bahn of 1998 allows the application of this instrument track charge reductions for low-noise vehicles have not been introduced in Germany so far.

3 - RAILWAY NOISE ABATEMENT IN THE EUROPEAN UNION

With the Green Paper **Future Noise Policy** of November 1996 the European Commission began to step up its activities in the field of European noise abatement policy. The Commission has convened various working groups (WG) composed of national experts on noise reception and emissions to develop proposals for the new European noise policy. The first WG on emissions, the WG Railway Noise, started its work in December 1999.

The WG Railway Noise has the following tasks:

- In order to stimulate and increase the competitiveness of the European railways the Commission has enacted and plans to enact Directives on the **Interoperability** of the European Railway systems (high speed systems: 1996, conventional systems: draft 1999). These Directives will be complemented by technical specifications, among others for the noise emissions of railbound vehicles. For this purpose noise limits and measurement procedures must be developed. The WG Railway Noise has to evaluate whether the joint draft of the European and international standard (prEN ISO 3095) for the measurement of railbound vehicle noise emissions is an appropriate method.
- In March 1999 the international railway association UIC, the Community of European Railways CER and the international association of private car owners UIP proposed a **voluntary agreement** to the Commission: to retrofit freight wagons by replacing the cast-iron brake blocks with composite blocks (UIC action program). The Commission has invited the associations to participate in the WG and has asked the WG Railway Noise to evaluate this proposal.
- Furthermore, the WG Railway Noise shall evaluate the principal options for an improved strategy to mitigate railway noise taking into account the economic aspects of noise reduction. The following instruments will be considered:
 - Noise emission limits for railway vehicles
 - Track-related measures
 - Economic instruments such as emission-related track charges

Germany will propose the following **strategies** for the future European railway noise policy:

- A **noise emission regulation** will be the most important measure to stimulate the speedy implementation of advanced noise reduction techniques and to promote a single rail transport market with a high interoperability.
- The emission regulation must be complemented by national **noise reception limits** in order to promote track-related measures with a high cost-benefit ratio, such as acoustically optimized rail grinding.
- **Emission-related track charges** will be an incentive for the use of low-noise vehicles **before** enforcement of emission regulations and by companies from **outside** the European Union..
- **Voluntary agreements** are a suitable instrument for accelerating the reduction of noise emissions from vehicles in service.