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**COMMISSION STAFF WORKING DOCUMENT**

**Rail freight noise reduction**

## 1. WHY THE PROBLEM OF RAILWAY NOISE IS IMPORTANT

Noise is one of the most widespread public health problems in the European Union, with ongoing high costs to society. According to the World Health Organisation (WHO)<sup>1</sup>, noise in the EU comes in second place, after air pollution in terms of causing disease and in the number of premature deaths. Economic costs of noise pollution include devaluation in house prices, productivity losses from health-related impacts, and distributional impacts. The health-related cost of road and rail traffic noise across Europe is huge, amounting to €40 billion in 2010, and is expected to increase unless further action is taken.<sup>2</sup>

The European Environment Agency (EEA) estimated in 2014<sup>3</sup> that railways are the second most dominant source of environmental noise in Europe, with nearly 14 million people affected (more than 4 million people estimated to be exposed to major railways transport outside urban areas and 9.5 million people estimated to be exposed to railways transport noise inside urban areas).

The general awareness of noise pollution has been rising in the EU over the last few years. Recent Eurobarometer survey results show that 29 % of EU-28 citizens are often or very often disturbed by traffic noise; of these, 13 % are affected by rail noise. According to the survey, the European citizens most disturbed by rail noise are Dutch (22 %), followed by Irish (20 %), Danes (20 %) and Austrians (19 %). The annoyance level in Germany is slightly higher than the EU average (15 %) and similar to that in the Czech Republic (15 %), Italy (16 %), Romania (16 %), Slovakia (15 %), Sweden (14 %) and the United Kingdom (14 %).

Noise is already a major reason for public opposition to rail transport in many European regions. In addition, according to the EU Reference Scenario 2013, rail freight traffic is expected to increase by more than 50 % by 2030, compared with 2010 levels. This means that reducing rail noise is becoming a condition to the development of the rail sector, which plays an important role in ensuring a sustainable mobility for European citizens.

## 2. WHAT HAS BEEN DONE SO FAR AT EU LEVEL

The Environmental Noise Directive 2002/49/EC<sup>4</sup> obliges national authorities to draw up **strategic noise maps and action plans** for major railways and large agglomerations. This allows the most problematic noise ‘hot spots’ to be identified and targeted. However, the Directive does not provide for binding limit values or targets, which reduces its effectiveness. In addition, measures taken are usually infrastructure-related (e.g. noise barriers along main lines and in agglomerations) and therefore costly and not cost-efficient.

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<sup>1</sup> [http://www.euro.who.int/\\_data/assets/pdf\\_file/0008/136466/e94888.pdf?ua=1](http://www.euro.who.int/_data/assets/pdf_file/0008/136466/e94888.pdf?ua=1).

<sup>2</sup> COM(2011) 321, Report from the Commission to the European Parliament and the Council, on the implementation of the Environmental Noise Directive in accordance with Article 11 of Directive 2002/49/EC.

<sup>3</sup> <http://www.eea.europa.eu/publications/noise-in-europe-2014>;

<sup>4</sup> Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise, OJ L 189, 18.7.2002, p. 12.

Railway rolling stock, on the other hand, has been required to meet certain **noise emission limits** since 2006. This obligation, applicable only to newly built wagons, was introduced under the Railway Interoperability Directive<sup>5</sup> through a technical specification for interoperability (TSI) on noise, adopted by the Commission in 2005 and amended several times afterwards.<sup>6</sup> However, as the lifespan of freight wagons can be 40 years or more, the renewal rate of the total fleet is slow, at an average of 2-3 % per year. This is the main reason for why it will take at least until 2030 to renew the whole EU fleet and reduce the current excessive noise levels, unless old wagons are retrofitted with composite brake blocks.

In order to speed-up progress, in 2008 the Commission adopted a Communication on rail noise abatement measures addressing the existing fleet, as part of the ‘greening transport’ package.<sup>7</sup> It announced a legal proposal to introduce **noise-differentiated track access charges** (NDTAC) as an economic incentive for retrofitting freight wagons with composite brake blocks. The replacement of cast iron brake blocks with innovative composite brake blocks is deemed to be the most efficient way of significantly reducing the noise generated by freight wagons. Using these blocks can reduce noise levels by up to 10 dB, which means halving them in terms of human perception.

Despite a Commission proposal for the mandatory introduction of noise-differentiated track access charges, the co-legislators (the European Parliament and the Council) opted for a voluntary approach, with the Commission mandated to harmonise charging principles, under the Rail Recast Directive 2012/34/EU<sup>8</sup>. Moreover, progress on voluntary measures has not been as quick as hoped. So far only two Member States, Germany and the Netherlands, have introduced comprehensive noise-differentiated track access charge schemes.<sup>9</sup>

The costs linked with retrofitting have been hampering railway undertakings and wagon owners from achieving a faster pace of progress. In addition to the estimated € 1688 attributed on average to retrofitting each freight wagon, stakeholders have noted substantial life-cycle costs related to the usage of retrofitted wagons. To assist the sector in meeting these high costs and maintain the competitiveness of the rail sector, the Commission has proposed to co-fund a part of these costs at the Union level. This approach was formalised in Regulation (EU) No 1316/2013 establishing the Connecting Europe Facility (CEF)<sup>10</sup> which allows **20 % of co-funding for the eligible costs of retrofitting existing freight wagons with composite brake blocks**.

Even if fully applied, the measures described above cannot ensure a noticeable reduction of railway noise within 5 to 10 years. If the efforts are not stepped up, rail freight noise will

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<sup>5</sup> Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community.

<sup>6</sup> TSI Noise currently in force: Commission Regulation (EU) No 1304/2014 of 26 November 2014 on the technical specification for interoperability relating to the subsystem ‘rolling stock — noise’ amending Decision 2008/232/EC and repealing Decision 2011/229/EU.

<sup>7</sup> COM(2008) 432 final, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0432:FIN:EN:PDF>.

<sup>8</sup> Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (recast), OJ L 343, 14.12.2012, p. 32.

<sup>9</sup> In addition, in Germany this is supported by national financial support covering 50 % of retrofitting costs.

<sup>10</sup> Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010, OJ L 348, 20.12.2013, p. 129.

remain a problem for EU citizens and their health and will not be sufficiently reduced before 2030.

There is also a risk that excessive levels of railway noise can lead to uncoordinated unilateral actions by Member States along the most important European rail corridors. These unilateral actions could take the form of national restrictions on rail freight traffic, in particular speed restrictions and restrictions on operating at certain times, especially at night.

As freight trains operate mostly at night, such measures would likely result in **bottlenecks** which, in turn, would have adverse effects on European economies and the railway sector. Furthermore, the restrictions would doubtless lead to a **reverse modal shift from rail to road**, with a related increase in negative economic, environmental and social impacts: road transport generates significantly more external costs than railway transport, including those related to congestion, noise, CO<sub>2</sub> and other harmful emissions. EU goals and on-going initiatives such as the 4<sup>th</sup> railway package go in the opposite direction: promoting the competitiveness and attractiveness of the rail sector.

In addition, more far-reaching national unilateral measures might be introduced to protect citizens from excessive levels of rail noise. Switzerland has already adopted a national law banning all rail freight wagons that do not comply with certain noise limits from its territory as of 2020 (or with a delay until 2022 if a similar measure is adopted at the Union level).<sup>11</sup> Some Member States have considered similar actions. Besides leading to more negative external effects, such piecemeal measures at national level would be a **breach of the principles of interoperability**, as laid down in Directive 2008/57/EC.<sup>12</sup> In addition, they could cause **disruptions to the provision of cross-border rail services**, with likely distortion of competition and obstacles to trade as well as the freedom of movement of goods and provision of services.

Equally important in terms of action at EU level is the nature of rail transport in relation to noise: while the effect of rail noise can be considered as local, the same cannot be said for the source of the problem (freight wagons). Today, about **50 % of rail freight transport is international and this figure is likely to increase further**. This means that many wagons run across borders, and any attempt to combat rail noise at source needs to recognise this. The effectiveness of measures adopted at national level is necessarily limited and strengthening them further would lead to the negative consequences described above.

As indicated above, there have been a number of noise-related initiatives over past years at the Union and national levels, not necessarily linked with each other nor consistently communicated or recognised by all stakeholders. Citizens from all Member States are entitled to be better protected from noise and to be properly informed about it. Equally, as reducing the noise of rail wagons comes at a cost, it is important that railway undertakings and wagon

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<sup>11</sup> Notification 2012/9503/CH, draft revision of the federal act on railway noise abatement, delivery of comments pursuant to Article 8(2) of Directive 98/34/EC of 22 June 1998: [http://ec.europa.eu/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa\\_notif\\_overview&sNlang=EN&iyear=2012&inum=9503&lang=en&iBack=2](http://ec.europa.eu/enterprise/tris/pisa/app/search/index.cfm?fuseaction=pisa_notif_overview&sNlang=EN&iyear=2012&inum=9503&lang=en&iBack=2).

<sup>12</sup> For example, it would be contrary to the definitions of ‘interoperability’ and ‘TSI’ which are set out in article 2 b) and i) of the directive. According to the first definition, ‘interoperability means the ability of a rail system to allow the safe and uninterrupted movement of trains’, and thus creating a hindrance to circulation goes against it. As to the second definition, TSI aims to ‘meet the essential requirements and ensure the interoperability of the rail system’.

owners have access to information about policy measures and how these will affect their business. This means, in particular, knowing what financial support they can expect and when stricter noise limits might potentially start to apply.

This Staff Working Document provides all this information and should therefore be regarded as a source of reference with a view to protecting European citizens from excessive railway noise and at the same time keeping the railway sector competitive and more acceptable in terms of public perception.

### 3. OPTIONS FOR THE FUTURE

The Commission services have analysed current problems and future risks linked with rail noise. Wide consultation and close cooperation with stakeholders was an important part of this process.

The results of these analyses and contacts confirmed that there is indeed a need to address rail noise and that measures currently taken at national/local level are not sufficient to reduce it.

A variety of ways to deal with the issue were examined. They are listed in the table below.

**Table 2: Initial policy options**

<b>Policy option</b>	<b>Description</b>
Status quo	This is the baseline. It assumes that no further EU action is taken beyond what is already in the legislation and that national measures to combat noise continue to exist.
Subsidy approach	This option examines financial incentives (financial support) to improve the rate of retrofitting wagons across the EU.
NDTAC approach	This approach examines the possible effects of the mandatory introduction of noise-differentiated track access charges (NDTAC) in comparison with the current situation (optional NDTAC).
TSI Noise approach	This option differs from the above market-based instruments by introducing a limitation on the level of noise produced by extending the technical specification for interoperability (TSI) Noise limit values to existing wagons, i.e. including those which were put in service before the first TSI Noise was adopted.
TEN-T / Density approach	This option considers noise limits for: <ul style="list-style-type: none"> <li>— the Trans-European Network for Transport (TEN-T network), given that this part of the rail network has the highest freight traffic intensity and carries most of the international traffic;</li> <li>— areas with the highest population density.</li> </ul>
Track maintenance approach	This option focuses on defining track standards and acoustic grinding, given the contribution of infrastructure to noise.
Holistic approach	This option assumes the introduction of mandatory noise trigger/limit values at EU level for all transport modes in the Environmental Noise

Policy option	Description
	Directive (END).

The options were combined into packages in order to maximise their effectiveness. The packages were analysed based on their direct economic, social and environmental impacts, using mostly quantitative methods.<sup>13</sup> This was followed by a qualitative assessment of indirect impacts, including public opposition to rail transport, gross domestic product (GDP) and employment, and overall regulatory costs.

The results of the analysis show that the holistic approach is by far the best performing, with the monetised impacts for 2015-35 in the range of €5475 million. However, using it would require a revision of the Environmental Noise Directive, its transposition and its implementation, which means that significant benefits are unlikely before 2022. The holistic approach was therefore discarded. However, it should not be completely ignored, because in a wider framework of the internalisation of noise costs it is by far the most attractive long-term policy paradigm.

It seems that in the short- to medium-term the optimal policy mix as regards the noise issue could be a package that includes:

- the harmonisation of noise-charging principles;
- a recommendation on financial support to help the sector make the fleet more silent;
- development of noise-related standards of railway infrastructure;
- the gradual applicability of noise limits set by the EU technical specification for interoperability (TSI) to freight wagons that carry out international transport operations, followed by an obligation for all freight wagons circulating in the EU to be compliant with the same noise limits.

The choice of this option could make it possible to **significantly reduce the level of noise for at least half of the population affected**. The monetised impacts of this option were estimated at €2255 million for 2015-35.

#### 4. MEASURES REDUCING RAIL NOISE

This Staff Working Document focuses predominantly on the mobile component of the noise problem, i.e. the freight wagons, as well as looking in addition at the quality of infrastructure in terms of acoustic performance. A step-wise transition could help maintain the competitiveness of the railway sector in order to avoid the undesirable modal shift towards road transport, which would have a negative effect on society, the economy and the environment. Such an approach would mean that in the future all wagons meet noise limit values, which would render the whole freight fleet silent. There is now consensus that the most effective way forward on reducing railway noise by up to 50 % (8-10 dB) is to replace

<sup>13</sup> The following elements were included in the analysis of impacts: economic benefit of noise reduction; noise cost due to modal shift; retrofitting cost; marginal life cycle costs; public support to retrofitting (national and EU); administrative costs; CO<sub>2</sub> cost due to modal shift; and cost of track maintenance..

cast-iron brake blocks with innovative composite brake blocks. Dealing with the problem at its source is much more cost-efficient than applying other measures, in particular noise-protection walls constructed along railway tracks.

In this context among possible measures reducing rail noise the following ones merit particular attention:

- **HARMONISATION OF NOISE-CHARGING PRINCIPLES**

Article 31(5) of Directive 2012/34/EU establishing a single European railway area<sup>14</sup> envisages an optional introduction of noise-differentiated track access charges (NDTAC) and the Commission already adopted on 13 March 2015 an implementing Regulation (EU) 2015/429<sup>15</sup> on this which applies from 16 June 2015. This implementing measure harmonises charging principles across the Union, provides clarity for the sector and, consequently, creates incentives for the quicker retrofitting of wagons and encourages more Member States to introduce noise-related infrastructure charges. Its main principles are the following:

- The decision to introduce a noise-differentiated track access charges is left to each Member State; however, if introduced, Regulation (EU) 2015/429 applies.
- Form of the scheme:
  - o mandatory bonus, or reduction of charges, for operating more silent wagons, i.e. ones that comply with TSI Noise limit values; additional bonuses possible in specific cases.
  - o voluntary malus, or surcharge, for operating noisy wagons, i.e. ones that do not comply with TSI Noise limit values;
- Bonus level: the minimum bonus value has been set at EUR 0 0035 per axle-km, with the possibility for infrastructure managers to increase it to take into account inflation, mileage run by wagons, and operating costs linked with the use of retrofitted wagons.
- Duration: until the end of 2021, with the possibility of applying malus after this date.

It can be reasonably expected that an increasing number of Member States, especially those more centrally located, will adopt such a measure in the coming years. By allowing the inclusion of higher operating costs in the calculation of the bonus level, the harmonised rules should also give wagon owners and railway undertakings the incentive to decide on quicker retrofitting and reduce the risk of financial difficulties due to the high costs of noise reduction.

- **EUROPEAN AND NATIONAL CO-FUNDING OF RETROFITTING**

Making freight wagons more silent is costly and may negatively impact on the competitiveness of the rail sector. Therefore, public financial support that complies with State aid rules<sup>16</sup> is provided to compensate the retrofitting costs of wagons at national and Union

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<sup>14</sup> Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (recast), OJ L 343, 14.12.2012, p. 32.

<sup>15</sup> Commission's implementing Regulation (EU) 2015/429 setting out the modalities to be followed for the application of the charging for the cost of noise effects, OJ L 70, 14.3.2015, p. 36.

<sup>16</sup> The subsidies might be deemed to constitute State aid within the meaning of Article 107(1) of the Treaty on the Functioning of the European Union (TFEU) and would thus in principle be subject to notification to the Commission pursuant to Article 108(3) TFEU, unless such support has already been



levels. It is assumed that by providing financial support to the operators and wagon keepers during a limited period (until 2021) and up to a maximum amount, retrofitting can be sped up and thus noise emissions reduced, without the negative modal shift towards roads.

At EU level, Regulation (EU) No 1316/2013 establishing the Connecting Europe Facility (CEF) includes support actions to reduce the level of rail freight noise by co-funding the retrofitting of rolling stock with composite brake blocks. A total budget in the range of €164-213 million has been earmarked for noise measures until 2020 and the maximum level of funding is 20% of the eligible investment costs. The money available is distributed via annual calls for proposals.

To complement CEF funding, Member States may establish national programmes supporting the retrofitting of freight wagons with composite brake blocks. In such a case the primary focus in initial funding should be those freight wagons which circulate internationally.

To minimise the possible distortion effect that any financial support could have on competition in the internal market, they should be limited in time (until the end of 2021 at the latest) and comply with the EU's State aid rules: their financial support should be limited to 50% of relevant investment costs.

- **APPLICATION OF TSI NOISE TO EXISTING FREIGHT WAGONS**

Currently, only new wagons have to respect noise limit values set in TSI Noise. This does not allow for a sufficiently rapid transformation of the EU fleet towards silent wagons, as demonstrated above. On the other hand, it would be disproportionate and costly to impose an obligation that all existing noisy wagons comply with TSI Noise limits by a given date without providing an appropriate transition period and financial assistance.

Whilst the Interoperability Directive does not currently allow for the application of TSIs to rolling stock approved for operation before the entry into force of a given TSI, that is, to "existing wagons", the Recast Interoperability Directive, which forms part of the 4<sup>th</sup> Railway Package<sup>17</sup>, has established the appropriate legal basis.

The **gradual introduction of the rail noise limit values** set out in TSI Noise through three steps might be an avenue to be considered in the future. It might take a following form:

- Step 1, the supporting financial measures available for the railway sector will help it to retrofit existing freight wagons, especially the international ones, with composite brake blocks.

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approved by the Commission as individual aid or has been granted on the basis of an approved scheme or is in compliance with the Commission Block Exemption Regulation (EC) N 651/2014. For the assessment of such aid measures the guidelines on State aid for railway undertakings apply (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:184:0013:0031:EN:PDF>). An alternative would be to apply the Guidelines on State aid for environmental protection and energy 2014-2020 ([http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628(01)&from=EN)) and specifically the provisions for aid for undertakings going beyond Union standards or increasing environmental protection in the absence of Union standards or aid for the early adaptation to future Union standards.

<sup>17</sup> COM(2013)30 final – 2013/0015(COD);

- Step 2, the TSI Noise limit values might apply to all international freight wagons, with the possibility, under certain conditions, for Member States to allow the circulation on their territory of international freight wagons that do not comply with these values<sup>18</sup>.
- Step 3, full applicability of TSI Noise to all existing freight wagons might be considered at certain point in time<sup>19</sup>.

The existence of financial support for retrofitting existing freight wagons coupled with these steps would enable a smooth switch from the current system to the new one.

- **NOISE-RELATED STANDARDS OF RAILWAY INFRASTRUCTURE**

Rail noise is a result of an interaction between the wheel and the track. The costs and benefits of managing acoustic track quality through rail grinding together with other relevant track maintenance technology merit further research and testing. The **Shift2Rail initiative** might be regarded as an appropriate tool here. Voluntary standards and exchange of best practice could be useful in order to speed up progress, before considering further measures in the long term.

## 5. CONCLUSIONS

Rail noise is the most sensitive environmental problem for the railway sector and a serious hindrance for citizens living close to railway lines. Not dealing with it in a timely manner would have negative spill over effects beyond the sector, with a risk of restrictions within the sector and more harmful effects for many people.

Available instruments and financial means should be drawn upon as extensively as possible, in particular (a) differentiated access charges depending on the level of noise produced, with (b) national and Union financial support to be used to their maximum potential in the next few years, combined with (c) a look at noise-related standards for infrastructure. Finally, more efforts should be undertaken to apply the existing rail noise limit values set out in technical specifications for interoperability (TSI) to all existing rail freight wagons. The benefits of more silent railways are undeniable, not only for EU citizens, but also for the sector and the Single market at large.

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<sup>18</sup> For the setting out the transitional period the following elements might be taken into consideration:

- the duration of the EU noise-differentiated track access charges scheme is 2016-21, as provided for in the Commission's implementing Regulation (EU) 2015/429 on noise charges;
- the Environmental Noise Directive requires Member States to prepare strategic noise maps no later than 30 June 2017 and subsequently every five years;
- the usual -year wagon maintenance cycle amounts to 7 years.

<sup>19</sup> It is estimated that in case of applying the describe package as many as 97 % of wagons might already be silent by 2026.