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EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT

Accompanying the document

Proposal for a Regulation

on the sound level of motor vehicles

{COM(2011) 856 final}
{SEC(2011) 1505 final}

1. PROBLEM DEFINITION

1.1. Policy context

The Motor Vehicle Noise Directive (Directive 70/157/EEC) and its amendments cover the requirements for motor vehicle exterior pass-by noise under test conditions, i.e. they describe the testing procedure and set noise limits. The original Directive and subsequent amendments had two objectives. Firstly, they aimed to ensure that for certain categories of motor vehicles, noise limits of individual Member States would not form barriers to trade. The second goal was to tighten the noise limits to reduce environmental noise. The amending Directive 92/97/EEC introduced mandatory common noise limits applicable to all Member States.

By Council Decision 97/836/EC, the European Community acceded to the Agreement of the United Nations Economic Commission for Europe (UN/ECE) concerning the adoption of uniform technical prescriptions for wheeled vehicles. This ensures that the EU vehicle type approval is harmonised with a broader range of countries outside the EU so that EU producers can use the same production lines for these export markets as for the internal market. The test procedure and the limit values of UN-ECE Regulation No. 51 are equivalent to those of the EU Directive.

Although the 70/157/EEC Directive succeeded in harmonising the type testing procedure and noise limits, it failed in reducing real traffic noise levels, as especially for cars, real conditions differ from the test conditions, tyre noise increased relative to power train noise and the volume of traffic continuously increased and it will continue in the future. For this reason noise from road traffic was also approached in the more recent Directive 2001/43/EC and Regulation No 661/2009 covering tyre noise and in Directive 2002/49/EC regarding the assessment of environmental noise.

The exposure of people to traffic noise can be reduced in different ways: through reducing noise limits at the source, i.e. directly reducing noise limits emitted by cars or through other indirect measures such as tax relief schemes for environmentally friendly investments (e.g. Vamil and MIA in the Netherlands)[1], standards for acquisition of quiet delivery vehicles (e.g. PIEK[2] standard), traffic restrictions (e.g. the low noise truck sign as required on alpine transit routes in Austria), rerouting and speed restrictions or noise abatement solutions (noise barriers, quiet road surfaces, façade insulation). However, those measures are most effective in technical and economical terms if combined with noise reduction at the source.

The Communication from the Commission regarding a European strategy on clean and energy efficient vehicles of 28.04.2010 announced that the Commission will present a proposal in 2011 to amend the respective legislation to reduce the noise emissions of motor vehicles.

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1 http://www.senternovem.nl/vamil_mia/English.asp

2 http://www.bmwt.nl/files_content/Certificatie-%20en%20toezichtprocedures%20PIEK.pdf

1.2. Identified problems

Inadequate methods for measuring road traffic noise

The latest amendment to the vehicle noise legislation in 1995 led to a reduction of noise emissions of 85 % for cars (-8 dB(A)) and of over 90% for heavy lorries (-11 dB(A)) compared to the initial limit values established in 1970. However studies have shown that the reduction in actual road traffic noise levels has been much less: only 1 - 2 dB(A). The reasons for this low level of effectiveness can be attributed to: relaxed limits in the early years, a slow replacement of older and noisier vehicles with newer ones, significant growth in traffic, the use of wider tyres with different characteristics for higher speeds and to the test procedure that does not reflect realistic driving conditions.

Following the adoption of the Regulation 661/2009 which lays down new noise requirements for motor vehicle tyres, the next step to further reduce vehicle noise emissions in the future is through improving the type-approval requirements for the whole vehicle. This includes the reduction of the overall limit values by looking at all noise sources of motor vehicles, from the air intake over the power train to the exhaust with special consideration of the tyre contribution, together with an improved test procedure.

The current noise test protocol, which has been in force since 1970 with subsequent amendments, requires a full throttle acceleration of the test vehicle. However, this does no longer reflect the real life driving behaviour. Due to changes in vehicle technology and the increase in traffic, partial throttle acceleration is nowadays mainly applied. Therefore, an updated test methodology that allows for setting of optimal limit values appears as the main way forward to reduce noise levels.

In response to the identified problem, the UN-ECE Working Party on Noise developed a new test method which was published in 2007 and monitored in parallel with the existing test method for the past three years. The monitoring allowed for collecting a database of parallel test results necessary for assessing the new method and quantifying the differences between the two methods.

In comparison to the old method the new one is design independent and corresponds better to current urban driving conditions. It consists of *both* acceleration and a constant speed test. Further differences are related to applicable allowances and the choice of tyres for the test.

Negative health effects from road traffic noise

According to the EEA report 'Transport at a crossroads 2008', almost 67 million people (i.e. 55 % of the population living in agglomerations with more than 250 000 inhabitants) are exposed to daily road noise levels exceeding 55 dB L_{DEN}[3]. This

[3] **L_{DEN}** is a measure of noise exposure at a specific local spot, e.g. a street. It is defined as the weighted energy average of day-evening-night levels and strongly depends on the road type, the location and traffic variation during a 24 hour period. In many cases, the numbers of cars are so much larger than other vehicle types that they tend to determine the overall L_{DEN} level, often dominated by the evening or

figure is a commonly established 'threshold value' above which there is a higher likelihood of adverse health effects. Almost 48 million people are exposed to levels exceeding 50 dB L_{night}[4] with road noise being by far the largest source of exposure to night time transport noise. Almost 21 million people (i.e. 17 % of the population living in urban agglomerations) live in areas where night-time road noise levels have detrimental effects on health.

Traffic noise in urban areas in Europe is a major environmental stressor. In the first place, noise exposure can lead to disturbance of sleep and daily activities, to annoyance and to stress. Over a prolonged period of exposure these effects may in their turn increase the risk of cardiovascular disease and psychiatric disorders. The 2008 WHO-report 'Economic valuation of transport-related health effects, with a special focus on children'[5] identified the following health endpoints for noise exposure: severe annoyance, reduced sleep quality, severe sleep disturbance, insomnia, ischemic heart disease (e.g. hypertension). Given the known effects on health, quality of life and consequential costs, real reductions in noise exposure are highly desirable.

Potential risk of fragmentation of the internal market

If the technical requirements regarding the noise emissions of motor vehicles are not updated to technical progress by using an adequate test methodology and applying acceptable limit values there is a risk of fragmentation of the internal market. Member States might see a need to introduce other measures to eliminate negative health effects for their citizens. This could be the introduction of special zones only accessible for low noise vehicles or other local measures.

1.3. Who is affected, in what ways and to what extent?

Current noise emissions from motor vehicles affect all citizens, in particular urban inhabitants of areas with high traffic. Other stakeholders affected by the Motor Vehicle Noise Directive include: road authorities, local and national authorities, health authorities, the automotive industry including suppliers, type approval bodies, the consumer market for road vehicles, the professional market for road vehicles (lease and rental companies), truck, van and taxi fleet owners. Once the legislation on noise emissions has been adopted at the EU level and approved under the UN-ECE all parties to the 1958 UN-ECE Agreement would be affected.

2. ANALYSIS OF SUBSIDIARITY

The legal basis of this initiative is Article 114 of the Treaty on the Functioning of the European Union on the approximation of laws.

As noise emission limits and the type-approval procedure for motor vehicles are already harmonised any modifications to the Motor Vehicle Noise Directive can only be done at the EU level. This does not only prevent fragmentation of the internal

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night levels as these have stronger weighting. Along some roads heavily used by freight vehicles, lorries and heavy goods vehicles can sometimes dominate the L_{DEN}

[4] **L_{night}** is mostly dominated by the higher numbers of cars, as most traffic on urban roads runs in the daytime. It contains a mix of power train and tyre noise, but more power train noise for intermittent traffic flow. On routes with significant night time freight traffic such as some motorways, lorries and heavy goods vehicles can sometimes dominate the L_{night}.

[5] http://ec.europa.eu/health/ph_projects/2003/action3/action3_2003_08_en.htm#3

market, but also ensures equal health, safety and environmental standards across the EU as well as it offers advantages of economies of scale: products can be made for the whole European market, instead of being customised to obtain national type-approval for every single Member State.

Given the current levels of environmental noise and affected citizens and the fact that EU noise limits have not changed in the last decade despite increasing traffic levels, a change in limits to remedy this situation is considered proportional.

3. OBJECTIVES

GENERAL	SPECIFIC	OPERATIONAL
1. To ensure a high level of health and environmental protection	1. To reduce the negative impact of noise exposure of European citizens caused by motor vehicle traffic	To modify and improve the applicable test methods and requirements within the European system for the type-approval of motor vehicles with regard to their noise emissions
2. To safeguard internal market for motor vehicles	2. To ensure the good functioning of the internal market for motor vehicles with regard to their noise emissions	

4. POLICY OPTIONS

Option 1: **No policy change: old test method and the existing limit values**

In this option the current limit values together with the allowances will remain valid, as well as the old measurement method.

Option 2: **New test method and the existing limit values**

In this option the new measurement method will be combined with the current set of limit values.

Option 3: **New test method and limit values equivalent to old ones**

This option aims at the use of the **new test method in combination with limit values**, such that they do not lead to more severe requirements than incorporated in the current test method and applicable limit values. This option foresees new limit values that will not modify the level of stringency compared to the old system.

Option 4: **New test method and reduced limit values introduced in one stage**

Option 4 proposes new limit values in combination with the new test method in such a way that a reduction of the authorised noise emissions per motor vehicle may be expected**.** The proposed reduction of the vehicle noise limit values by 3 dB(A) for light vehicles and 2 dB(A) for heavy vehicles might take effect from 1 January 2014.

Option 5: **New test method and reduced limit values introduced in two stages**

In comparison to Policy Option 4, in Policy Option 5 a more ambitious final target for noise reduction is pursued. This would be achieved in two stages. The first step is a reduction of 2 dB(A) for light vehicles and 1 dB(A) for heavy vehicles and can be introduced on 1 January 2013. The second step is a reduction of 2 dB(A) for light vehicles and 2 dB(A) for heavy vehicles. It will require more development effort and a more drastic set of technical measures: this step can be introduced from 1 January

2015. The total reduction would be 4 dB(A) for light vehicles and 3 dB(A) for heavy vehicles.

5. ASSESSMENT OF IMPACTS

5.1. Approach

The present impact assessment covers the environmental, social and economic aspects of the five policy options.

The environmental impact is defined in terms of reduction of L_{DEN}, L_{night} and single event levels. The social impact takes into account the influence of noise on annoyance, sleep disturbance, health effects and quality of life. The economic impacts include their monetisation, reduced need for traffic noise abatement solutions and costs to industry, following guidelines on cost benefit analysis.

5.2. Environmental impact

In terms of current legislation the impact of environmental noise is the time averaged equivalent noise level L_{DEN} and the averaged night time noise level L_{night} at facades of dwellings, calculated as required by the Environmental Noise Directive 2002/49/EC.

Analysis

The differences between the policy options are set out in the table below. Option 2 shows an increase in impact due to the fact that effectively higher noise levels would be allowed (average increase 1,7 dB(A). The average reduction in traffic noise levels is 2,5 dB(A) for option 4 and 3,1 dB for option 5. These reductions are higher for intermittent traffic, 2,8 dB(A) for option 4 and 4,1 dB(A) for option 5[6]. They take effect only gradually, and are only fully in place after all vehicles are replaced, i.e. 13 years after coming into force of the new limits. Part of the reduction may occur earlier due to the changes in tyre noise levels, especially for free flowing traffic.

dL_{DEN}	Residential road with intermittent traffic	Residential road with free flow traffic	Main road with intermittent traffic	Main road with free flow traffic	Arterial road with free flow traffic	Urban motor way with free flow traffic	Rural motor way with free flow traffic	Rural road with free flow traffic
Option 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Option 2	+ 1,8	+ 1,8	+ 1,5	+ 1,7	+ 1,6	+ 1,6	+ 1,7	+ 1,5
Option 3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Option 4	- 2,8	- 2,5	- 2,9	- 2,4	- 2,4	- 2,4	- 2,4	- 2,4
Option 5	- 4,0	- 2,9	- 4,2	- 2,6	- 2,7	- 2,7	- 2,7	- 2,7
dL_{night}								
Option 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Option 2	+ 1,8	+ 1,8	+ 1,4	+ 1,6	+ 1,6	+ 1,5	+ 1,6	+ 1,5
Option 3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Option 4	- 2,7	- 2,5	- 2,8	- 2,4	- 2,4	- 2,4	- 2,4	- 2,3
Option 5	- 3,8	- 3,1	- 4,0	- 2,7	- 2,7	- 2,7	- 2,7	- 2,7

[6] Figures calculated as average of the values in table 7

5.3. Social and health impacts

The social impact of road traffic noise is commonly measured as the percentage of seriously annoyed people with $L_{DEN} \geq 55$ dB at the dwelling facade. The annoyance levels may affect quality of life and health in general.

Quality of life covers a range of factors including concentration and speech intelligibility at work, home and school, which are difficult to quantify, and quality of residential, recreational and preservation areas, where a quiet environment is valued. Although high noise levels in urban areas affect most people, increasingly effort is also made to protect those rural areas from traffic noise where it is often present. In terms of health, links have been made to the occurrence of myocardial heart disease, hypertension and stress and sleep disturbance. Also estimates have been made of the number of Disability Adjusted Life Years (DALYs)[7] due to environmental factors including noise exposure.

The annoyance level has been demonstrated to correlate well with L_{DEN} for different types of traffic noise source. In a similar way, sleep disturbance is correlated with L_{night}.

Building on the previously calculated L_{DEN} and L_{night} levels, exposed numbers of people and the dose-effect relationships the following calculations have been made with regard to the number of annoyed, highly annoyed and sleep disturbed people for each policy option.

	Million highly annoyed	Million highly sleep disturbed	Million annoyed	Million sleep disturbed
Option 1	55	27	119	60
Option 2	64	30	133	66
Option 3	55	27	119	60
Option 4	44	22	99	51
Option 5	41	22	95	49

5.4. Economic impacts

Economic impact for industry

The technical-economic impact of changing the directive is mainly for the car industry (manufacturers, suppliers and tyre industry) and consists of changes to the test method and the limits, resulting in costs incurred to achieve noise reductions. These costs include production costs per unit and development-, engineering- and testing-costs, which are relevant for new models or model upgrades. The future noise reduction due to quieter tyres is assumed to be ensured by the tyre noise directive,

[7] http://en.wikipedia.org/wiki/Disability-adjusted_life_year

and although some costs may be borne by the tyre industry, quieter tyres are already available on the market for no or little additional cost and will be compulsory after 2016. The costs for complying with the Regulation on tyre noise[8] are not included in this analysis.

Analysis

The combined development and production costs show that the production costs are generally much higher than the development costs when taken over a 7[9] year period. The following table shows the costs for options 4 and 5. The options 1 to 3 do not require a change in the automotive production therefore no additional development and production costs are considered. Those are assumed to be 0 and only options 4 and 5 are looked at more closely in the tables below showing the additional discounted development and production costs in million Euros.

The impact on the vehicle industry amounts to 4 billion Euros for option 4 and 6 billion Euros for option 5[10]. These costs are incurred over a development and production cycle of 3 + 7 years and consist mainly of additional production costs which are no longer incurred after 10 years.

8 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:200:0001:0024:EN:PDF

9 This implies that fundamental design changes may only come into production after 5 years, and that all existing vehicle models will be fully replaced after 7 years.

10 As required by the Commission Impact Assessment Guidelines, industry costs have been discounted at an annual rate of 4% as they are incurred in the future.

M€	**Option 4**				**Option 5**			
Year	Development	Production	Total	Incl. discount 4%	Development	Production	Total	Incl. discount 4%
2010	42,3	0,0	42,3	42,3	111,1	0,0	111,1	111,1
2011	42,3	0,0	42,3	40,7	111,1	0,0	111,1	106,9
2012	42,3	0,0	42,3	39,1	111,1	0,0	111,1	102,7
2013	42,3	1113,2	1155,5	1027,3	111,1	1608,3	1719,4	1528,5
2014	42,3	954,2	996,5	851,8	111,1	1378,5	1489,6	1273,3
2015	42,3	795,1	837,5	688,3	111,1	1148,8	1259,9	1035,5
2016	42,3	636,1	678,4	536,2	111,1	919,0	1030,1	814,1
2017	0,0	477,1	477,1	362,5	0,0	689,3	689,3	523,8
2018	0,0	318,1	318,1	232,4	0,0	459,5	459,5	335,8
2019	0,0	159,0	159,0	111,7	0,0	229,8	229,8	161,4
2020	0	0	0	0	0	0	0	0,0
2021	0	0	0	0	0	0	0	0,0
2022	0	0	0	0	0	0	0	0,0
2023	0	0	0	0	0	0	0	0,0
2024	0	0	0	0	0	0	0	0,0
2025	0	0	0	0	0	0	0	0,0
2026	0	0	0	0	0	0	0	0,0
2027	0	0	0	0	0	0	0	0,0
2028	0	0	0	0	0	0	0	0,0
2029	0	0	0	0	0	0	0	0,0
2030	0	0	0	0	0	0	0	0,0
Total M€	**296**	**4453**	**4749**	**3932**	**778**	**6433**	**7211**	**5993**

Economic impact for society

The main elements of the social-economic impact are (1) perceived monetised benefits of noise reduction, (2) benefits from savings on health costs and (3) benefits from savings on noise abatement. Taking the above considerations into account, the overall annual benefits are the sum of each of the hedonic pricing benefits, health savings benefits and noise abatement savings benefits. The identified health problems linked to the exposure to noise lead to the following typical type of costs: (1) Costs of medical care (direct costs), (2) Economic production losses (direct costs), (3) Suffering and grief (intangible costs).

Valuation of noise reduction by hedonic pricing

In order to value the benefits of traffic noise reduction the method given in the EU position paper on valuation of noise (2003) was used. It reflects how much citizens are prepared to pay for noise reduction around their homes, and variation in house prices depending on outdoor traffic noise levels[11].

Valuation of health effects

The estimates are derived from a Swiss study and scaled up in proportion to the ratio of Swiss population (7.6 Million) relative to that of the EU27 (500 Million). The annual health benefits for the EU27 then amount to 84.5 million Euros per dB(A) noise reduction, which is equivalent to 5.92 € per person per dB(A) per year.

[11] The perceived benefit of noise reduction per household per year, based on willingness-to-pay and hedonic pricing calculation methods, is a figure of 25 €/dB/household/year (2002). The benefits are calculated for the number of exposed persons in the L_{DEN} calculation, which is 451 million.

Benefits from abatement savings

Benefits from savings on noise abatement due to quieter traffic are assessed by estimating the reduced effective noise levels along roads where normally noise barriers[12], quiet road surfaces[13] or façade insulation[14] would be required. The total annual savings on all abatement measures are estimated for the EU27 in 2010 at 58 million Euros for policy option 4 and 79 million Euros for policy option 5, if the full noise reduction for each option were to take effect immediately. As the noise reduction only takes effect gradually, initial abatement benefits are zero, growing to a maximum at the end of the appraisal period..

6. COMPARISON OF OPTIONS

Comparison of Options in terms of their economic, environmental and social impacts.

Impacts / Option	Environmental impact	Economic impact		Social impact
		Costs for industry (development and production costs)	Benefits for society (hedonic pricing benefits, health and noise abatement savings benefits)	
Option 1 No policy change: old test method and the existing limit values	Negative impact due to traffic increase	No cost	No benefits	Negative impact due to traffic increase
	(0)	(0)	(0)	(0)
Option 2 New test method and the existing limit values	Average increase in traffic noise of 1,7 dB(A)	No cost	Negative Impact	Average increase of highly annoyed people by 16% Average increase of highly sleep disturbed people by 11%
	(--)	(0)	(--)	(-)

12 Noise barriers are typically only applicable for motorways and arterial roads where large noise reductions of 10-15 dB(A) are necessary.

13 Quiet road surfaces are a solution for all road types where tyre noise is predominant, although the reduction potential is limited to around 5 dB for motorways and 2.3 dB(A) for urban situations.

14 Façade insulation, with potentially large reduction potential up to around 30 dB(A) is applicable in all situations but is considered here as one of the few available solutions for main and arterial roads in urban areas.

Option 3 New test method and limit values equivalent to old ones	Negative impact due to traffic increase	No cost	No benefits	Negative impact due to traffic increase
	(0)	(0)	(0)	(0)
Option 4 New test method and reduced limit values in one stage	Average reduction of traffic noise between: - 2,5 and - 2,8 dB(A)	EUR 3932 million	EUR 103207 million (94707 million EUR of social benefits + 7831 million EUR of health benefits + 669 million EUR of abatement savings)	Average reduction of highly annoyed people by 20% Reduction of highly sleep disturbed people by 19%
		cost benefit ratio 26.2		
	(+)	(-)	(+)	(+)
Option 5 New test method and reduced limit values in two stages	Average reduction of traffic noise between: - 3,1 and -4,0 dB(A)	EUR 5993 million	EUR 123170 million (112849 million EUR of social benefits + 9446 million EUR of health benefits + 875 million EUR of abatement savings)	Reduction of highly annoyed people by 25 % Reduction of highly sleep disturbed people by 19 %
		cost benefit ratio 20.6		
	(++)	(--)	(++)	(++)

7. MONITORING AND EVALUATION

One of the key indicators to be taken into account for evaluating the performance of the proposed action is the noise monitoring under the Environmental Noise Directive. A noise reduction of motor vehicles should be reflected in a reduction of environmental noise in particular in urban areas. An additional indicator is the monitoring of the type-approval values of new models of motor vehicles. A substantial reduction in the measured values is an appropriate indicator whether the chosen option has positively contributed to the environmental objectives related to this policy initiative. Findings from monitoring might recommend developing a continuous strategy of regular limit value reductions until a considerably lower noise emission level is attained, that cannot be further reduced without fundamental changes in vehicle technology or in transport modalities.

A constant dialogue with the industry, aimed at monitoring the sector and its ability to develop suitable solutions within the next few years will be of utmost importance. In view of the implementation of the improved noise emission requirements, it will be essential to monitor the market and the development of different approaches and technologies towards a reduction of vehicle noise. This includes the automotive manufacturers and the suppliers for key products like tyres, exhaust silencers, gear boxes, engines, etc.. One suitable way of achieving this constant dialogue is to rely on the Working Group for Motor Vehicles (WVWG), where these stakeholders are represented.