



Stimulation of low noise road vehicles in the Netherlands

Dr. Gijsjan van Blokland¹

¹M+P Raadgevende ingenieurs, PO BOX 2094, NL-5260 CB Vught, The Netherlands

ABSTRACT

In the Netherlands the policy for low noise road vehicles is based on a system of push and pull. The push works on the loudest vehicles by setting legal limits to the maximum allowable noise emission. The pull works on the most silent vehicles, by stimulating market demand for low noise vehicles. Both ‘forces’ lead to a lowering of the average noise emission of road vehicles. In the Netherlands there are various initiatives which aim to stimulate the use of low noise products:

- Low noise PIEK trucks: Low noise delivery trucks get special permits to deliver their goods before the morning rush-hour or after the evening rush-hour, which reduces the time, fuel and costs of deliveries
- Low noise tyres: public information and procurement program on governmental vehicle fleet
- Hybrid and electric vehicles: monetary incentives to stimulate purchase of hybrid and electric vehicles
- Mega trucks: Allowance to drive with extra long trucks, which reduces the number of vehicles, costs, fuel and noise
- Low noise driving: Information and stimulation program to avoid high engine speeds for vehicles equipped with manual transmission.
- Low noise zones: initiatives of local cities to expand urban environmental zones with noise limits

Keywords: Stimulation, noise limits, road vehicles

1. INTRODUCTION

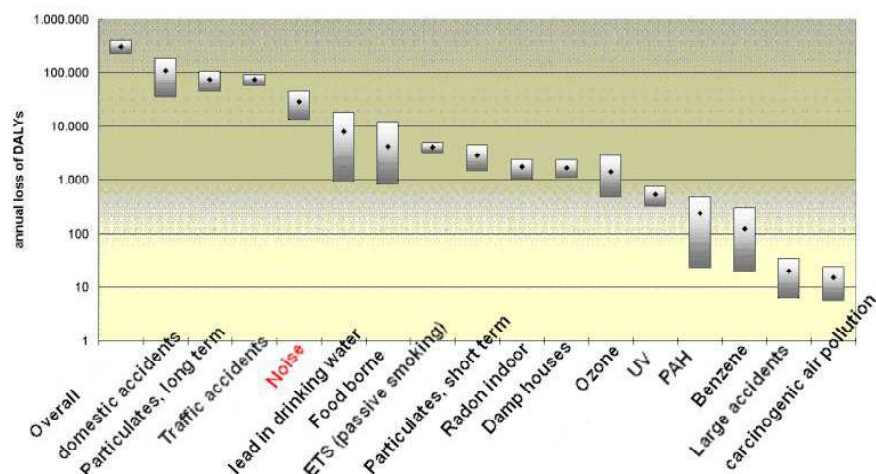


Figure 1 – DALY's of various environmental issues in the Netherlands. Noise is ranked 4th, just after traffic accidents

Traffic noise is one of the most important environmental problems in the Netherlands in terms of

¹ GijsjanVanBlokland@mp.nl

DALY's (Disability Adjusted Life Years). Noise reduction at the source is in most cases the most cost effective reduction measure and therefore has a high priority in the policy of the Netherlands. Reduction by means of barriers and insulation of houses is often less effective and more costly. Noise reduction at the source can be split up in three areas of potential noise reduction: vehicle drive lines, vehicle tyres and road surfaces. The policy on low noise road surfaces is mainly a national responsibility. The policy on low noise vehicles and tyres is bound by European rules, due to international trade agreements.

2. Push and pull

In the Netherlands the policy for low noise vehicles (both drive line and tyre) is based on a system of push and pull.

- **Push:** The loudest vehicles are banned from the market, by setting legal limits to the maximum allowable noise emission. Decisions are taken at a European level (EU and ECE). There is a history of regular lowering of limit values. The Netherlands is actively involved in this discussion, but is not allowed to set national demands beyond those of the European Union. The latest lowering of noise emission limits for tyres has been announced in 2009 with regulation EC/661/2009. On top of that a European tyre label has been announced with regulation EC/1222/2009, requiring actual noise data of tyres. The latest lowering of limit values for vehicles was announced in 1992 (EC/92/97). Updated limits are expected by the end of 2011 or early 2012;
- **Pull:** Manufacturers are stimulated to develop products that are more silent than the legal limit and customers are stimulated to ask for these products and buy them, by giving benefits to owners of low noise products. The stimulation of low noise products can be done on a national level or even a local level, but they should not interfere with European rules. Examples of stimulation programs in the Netherlands are given in chapter 3.

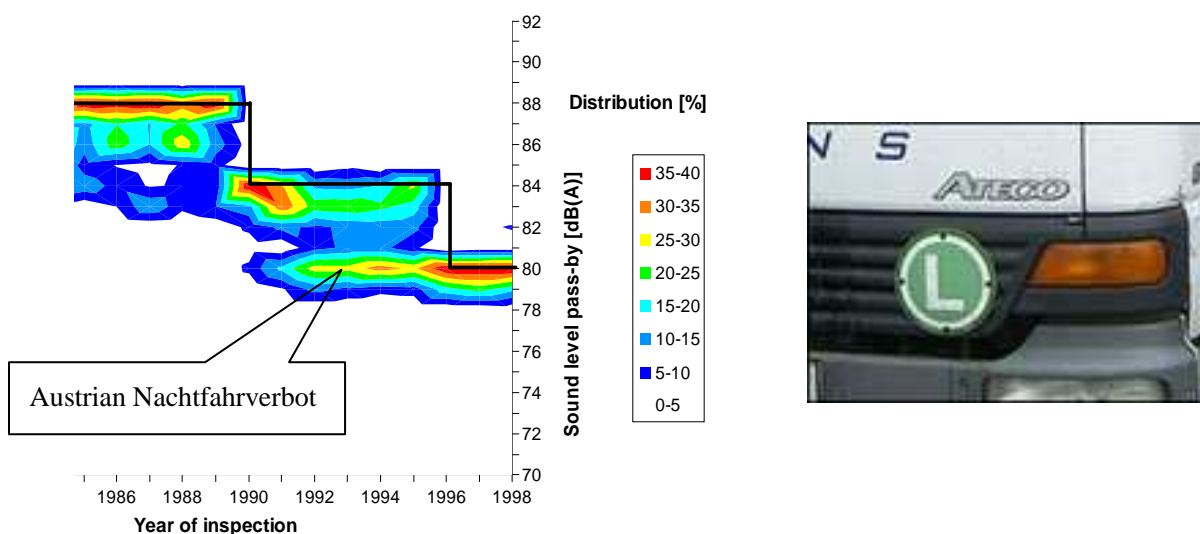


Figure 2 – Distribution of the noise emission of heavy trucks during type approval (left). The black line gives the limit value. Vehicles fulfilling the low noise requirements in Austria have to show a green L sticker (right)

Both forces, push and pull, lead to a lowering of the average noise emission of road vehicles. An example of their effect can be seen in figure 2, in which the distribution of noise emission of heavy trucks is depicted. In 1990 and 1996 there was a reduction of the legal limit values, which forced the loudest vehicles to become more silent. Surprisingly, in the period between 1990 and 1996 the majority of the trucks was 4 dB more silent than the legal limit. This was due to the advantage low noise trucks could gain with respect to the Austrian “Nachtfahrverbot”. On the most important transit road through Austria there was a night time truck ban installed. However low noise trucks with a noise emission of 80 dB, 4 dB below the legal limit, were exempted from this night time truck ban. Most truck companies developed such low noise trucks and most European transport companies bought

these low noise trucks, as the monetary benefits of this exemption outweighed the investment in a more expensive low noise truck. The Austrian Nachfahrverbot managed to significantly influence both the individual and the average noise emission of trucks in Europe.

3. Examples of low noise stimulation programs in the Netherlands

In the Netherlands there are various low noise stimulation programs. All of them have their impact on the local vehicle fleet. In the following paragraphs some of these programs are summarized.

3.1 Low noise delivery trucks

In the Netherlands there is a general ban on evening and night time delivery to shops (19.00-7.00). But there is an exemption for low noise vehicles with a noise emission below 72 dB(A). This 72 dB(A) is only applicable at low speed (< 20 km/h) and in close vicinity to the shop (typically < 50 m). This enables vehicles to install the 72 dB(A) in a whisper mode, operated by a button on the dashboard. When the whisper mode is active, hybrid vehicles may be forced to run in electric mode and combustion engines may run at limited engine speed. Even shutters around the engine and valves in the exhaust may be operated by the whisper mode. Outside of the zone around the shop, the whisper mode is switched off and the vehicle runs in standard mode. Some of the national super market chains have ordered their transport companies to prepare themselves for night time delivery and invest in low noise trucks. This boosts the market and several truck companies have developed vehicles with a 72 dB whisper mode. Like with the Austrian Nachfahrverbot the monetary benefits for night time delivery are obvious: trucks avoid the rush-hours and save time, fuel and money, while they emit less CO2 and exhaust gas emissions. (www.piek-international.com)



Figure 3 – The 72 dB Quiet Truck label and the first heavy truck applying for this label: a tractor running on CNG (compressed natural gas)

3.2 Low noise tyres

The noise limits of tyres were introduced in 2001 (EC/2001/43) and lowered by around 4 dB in 2009 (EC/661/2009). In 2009 the European commission also announced the obligation to communicate the actual noise emission of tyres by means of a tyre label (see fig 4). The regulation of 2001 only contained noise requirements. The two directives from 2009 contain also requirements on wet grip (safety) and rolling resistance (fuel consumption) in order to avoid a too much focussed optimisation on noise only, while potentially neglecting other important performances.

The Dutch Government has various campaigns on low noise tyres. Most important is the public information campaign, in which the government has measured many of the available tyres in the market on noise, rolling resistance and wet grip (www.kiesdenieuweband.nl). These measurement results are used for consumer information, to aid in the EU discussions on lowering of limit values and to guide the sustainable procurement program for the governmental vehicle fleet. The measurement results have been taken over by various other institutes in various countries (www.bettertyres.org.uk www.pneu-info.ch). As soon as the label information will be available, this will be incorporated in the information campaign.

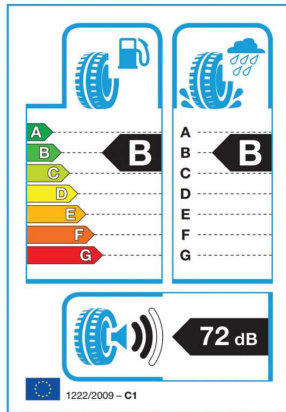


Figure 4 – The tyre label will be available from 2012 and includes the noise emission.

3.3 Hybrid and electric vehicles

Vehicles with a low CO₂ emission have been given tax advantages in the Netherlands. The requirements were such that for a significant time period only hybrid vehicles could fulfill these demands. This has given a boost to the sales of hybrid vehicles: from 0,1% in 2006 to 5,6% in 2009. In future the requirements will be tightened such that only pure electric vehicles and plug in hybrids may fulfil. It is expected that this will boost the sales of pure electric vehicles as well.

Propulsion noise of electric and hybrid electric vehicles is much lower compared to vehicles with combustion engine. For the noise emission of single events (high acceleration from low speed) and for more noisy vehicle classes like delivery vans and trucks the transition to electric vehicles is significant (see fig 6). For the equivalent noise emission of passenger cars this has a limited effect for several reasons. At higher speeds tyre road noise is dominant over propulsion noise. This transition speed is on average 30 km/h, but depends on vehicle type and driving circumstances. Besides that, electric vehicles may be equipped with acoustic warning signals at speeds below 25 km/h.



Figure 5 – Hybrid and electric vehicles have tax benefits in the Netherlands

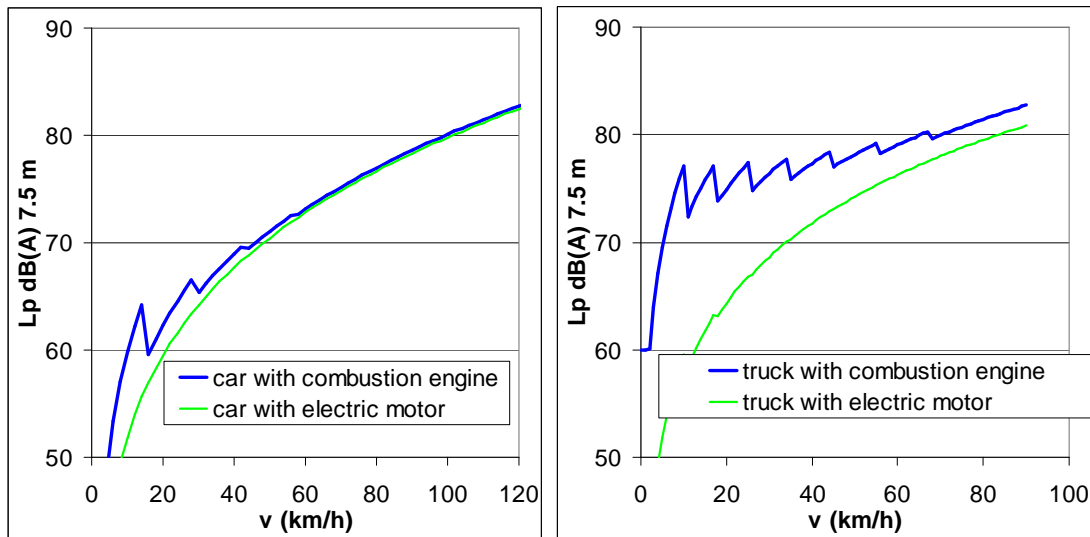


Figure 6 – Noise emission of electric vehicles compared to vehicles with combustion engine

3.4 Extra long trucks

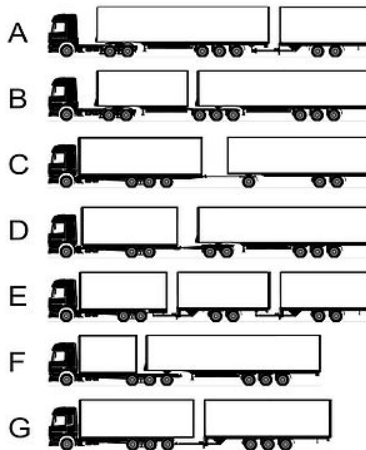


Figure 7 – possible vehicle combinations for a 25,25 meter long 3 TEU truck, now allowed in the Netherlands

Since May 2011 the maximum length of trucks has been increased in the Netherlands from 18,75 meter to 25,25 meter. The same truck size is already allowed for some time in Sweden and Finland. Tests with long trucks are running in Germany and Denmark. Due to the increased length trucks can now carry three instead of two 20 foot containers (TEU), which reduces the amount of vehicles necessary for the same load. Due to increased load of the engine and bigger number of tyres, the individual trucks are about 1 dB louder. But due to the reduced number of vehicles for the same load, the noise emission of the total fleet is reduced by about 1 dB. Obviously the costs are reduced as well, boosting the use of these trucks. Some organizations argue that the lower cost will increase the amount of transport, neutralizing the environmental effects of long trucks.

Extra long trucks are often used for inter city traffic from one distribution centre to another. The local distribution transport is done with smaller trucks and delivery vans. These vehicles are not only more agile, but also have a lower noise emission, especially if they are equipped as low noise truck (see par 3.1)

3.5 Low noise driving

For more than ten years there is a program run by the government in the Netherlands on eco driving. This is important, because 85% of the vehicles in the Netherlands is equipped with a manual gearbox. Bad driving behavior may lead to relatively high engine speeds and therefore high noise emission and

high fuel consumption. Drivers are made aware of the importance of eco driving by means of education of new drivers (part of the driving license requirements), TV spots and in vehicle or computer training for existing drivers.

The acoustical effect depends on the vehicle. Propulsion noise decreases on average by 3,7 dB [2] and by more than 10 dB on maximum levels. Due to the dominance of tyre road noise, the equivalent noise emission reduces by only 1 dB. On single events the noise reduction is more than 10 dB in individual cases.

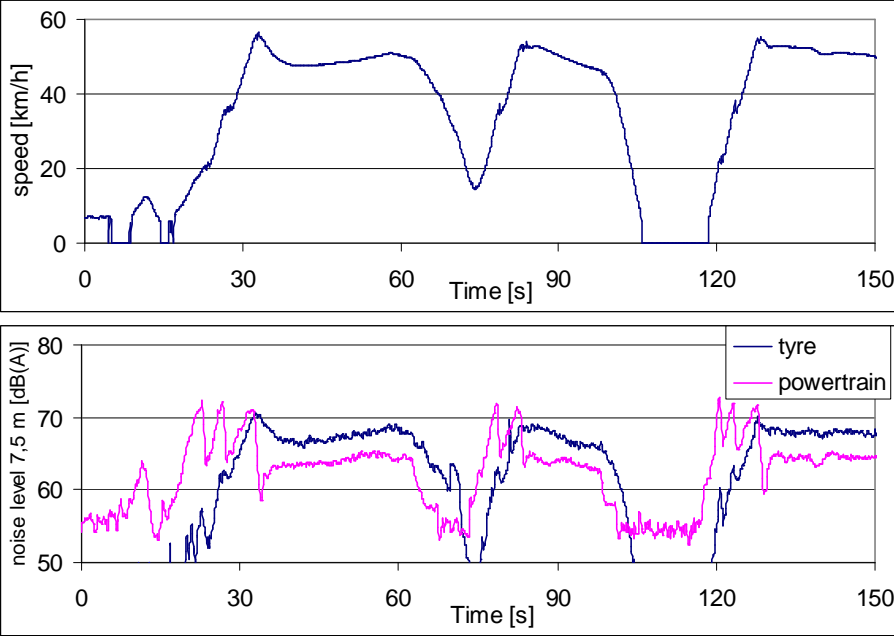


Figure 8 – Example of the measured noise emission during urban driving [2]

3.6 Low noise zones



Figure 9 – The city of Rotterdam is investigating if the access to environmental zones could expanded with noise requirements. Vehicles could be stickered if they comply with certain requirements.

Many European cities have an environmental zone (<http://www.lowemissionzones.eu/>). The access to these zones is limited to certain classes of environmental friendly vehicles. Both noise emission and exhaust gas emission can be a criterion for allowing access. It is currently already possible to ban noisy vehicles from a low noise zone. Especially a general ban of trucks or a general speed limit of 30 km/h are well known tools.

Now the city of Rotterdam has launched a pilot project in which it is investigated how the access to low noise zones can be based on the actual noise emission. The principal should be similar to the current system for exhaust gas emission. The tyre label (fig. 4) or the quiet truck label (fig. 3) could be criteria as well as the actual noise emission during vehicle type approval.

4. CONCLUSIONS

The European noise type approval for vehicles (EC/2007/34) and tyres (EC/661/2009) set the base demands for the noise emission of vehicles. Some local authorities have a higher ambition level. In that case a number of local initiative can be taken to stimulate or enforce the use of more silent vehicles. This paper describes six of such initiatives in the Netherlands. All of them have their effect on the local noise emission, but non of them is so effective as the Austrian Nachtfahrverbot, which managed to reduce the noise emission of 60% of the trucks sold in Europe in the time period between 1990 and 1996. On the other hand is the number of such local initiatives an indication for the European Commission when the noise limits should be tightened and harmonized on a European level.

REFERENCES

- [1] AB Knol, BAM Staatsen, “Trends in the environmental burden of disease in the Netherlands 1980 – 2020”, RIVM report 500029001/2005 (2005)
- [2] D.F. de Graaff, G.J. van Blokland, ‘Noise emission of passenger cars and vans during urban driving, Vehicle driving conditions, Source distribution and Emission values’, M+P report MVM.00.9.1 (2003)
- [3] B Peeters, G.J. van Blokland; ‘The Noise Emission Model For European Road Traffic’; Imagine deliverable D11; 2007
- [4] Erik de Graaff and Gijsjan van Blokland, “Akoestische kansen en bedreigingen van elektrische voertuigen”, Tijdschrift Geluid (juni 2011)