REDUCTION POTENTIAL OF ROAD TRAFFIC NOISE

A Pilot Study

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Input reports on specific subtopics have been obtained from

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The report with its appendices is available at

http://www.iva.se/templates/page.aspx?id=4354

Also, an edited version will be published by the Royal Swedish Academy of Engineering Sciences (in September 2007)

The Background

The starting point:

- unbalance between the noise emissions from ordinary traffic
- possibilities to achieve reasonable immission situations even with optimal use of measures on the immission side.

Typical immission equivalent levels are 60-65 dB. National goals are levels < 55 dB as a technical/economic compromise.

This means an unbalance of about 10 dB, so the question asked was whether a source reduction of 10 dB could be achieved with today's technology.

Focus of the report

- Contribution of different sources of road traffic noise based on calculation models developed in IMAGINE (Jens Forssén)
- Potential for the reduction of tyre/road noise with respect to tyres (Ulf Sandberg and Wolfgang Kropp)
- Potential for the reduction of tyre/road noise with respect to road surfaces (Ulf Sandberg and Thomas Beckenbauer)
- Potential for the reduction of vehicle noise (Lars Ivarsson)
- Future development based on scenarios for the example Norway (Truls Berge)

In addition the special Nordic situation was discussed with respect to the use of studded tyres

Main results from the project

The main findings of the report are

- That **5 dB(A) emission reduction can be achieved by utilising technology available today.**

- However, in order to reach the needed reduction of about 10 dB, research and development is needed on tyres and road surfaces. Even a modified vehicle concept might be required to be adapted to an increased demand on exterior noise when tyre/road noise is reduced.

Conclusions I

We have the tools in the form of relevant technical test methods for vehicles, tyres and road surfaces. This means that noise limits can be set for the products.

We also have good knowledge about lower noise technology. It is evident, however, that the political process towards sufficiently sharp noise limits in the UNECE regulations 51 and 117 is too slow. Instead of being slowly technology following as hitherto, the noise limits need to be technology driving.

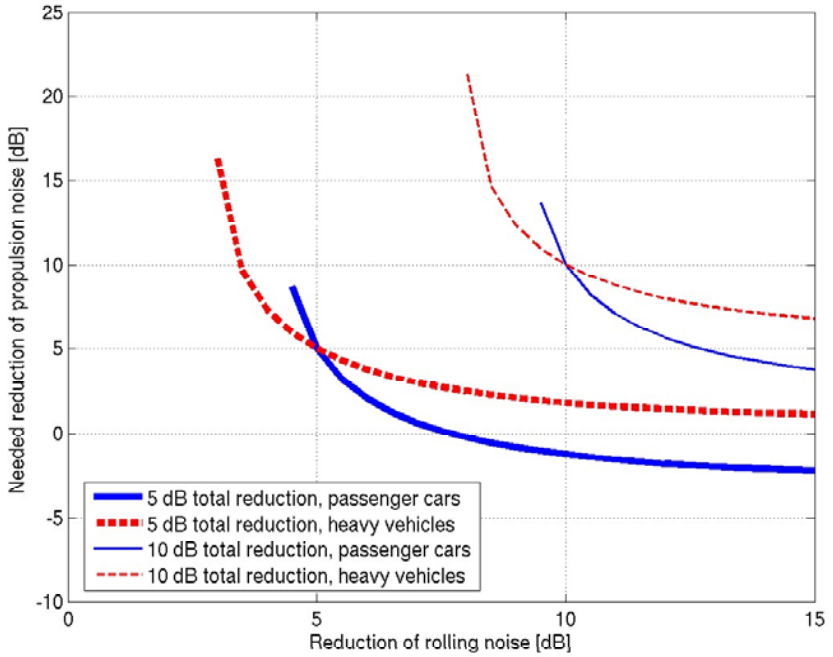
The coordination between the three parties (vehicle manufacturers, tyre manufacturers and road owners) needs to be much improved based on a holistic approach to the environment noise problem caused by the road traffic. Economic incentives could be a way to speed up the development.

Conclusions II

To obtain a reduction of the total noise by 5 dB, it is necessary to reduce both the rolling noise and the propulsion noise. But the necessary reductions are case specific.

To get a reduction of the total noise by 5 dB, one can see from these studies that tyre/road noise can be reduced by 6 dB, as one possible solution, and the needed reduction of propulsion noise is then around 4 dB for 30 km/h driving speed and around 2 dB for 110 km/h driving speed.

Needed reduction of propulsion noise to achieve a 5 or 10 dB reduction of the total noise (rolling and propulsion noise), for the Swedish case *50 km/h.* On the horizontal axis is the rolling noise reduction that is already in place



Conclusions III

The potential for reducing the propulsion noise is sufficient to obtain these 2-4 dB.

It is unlikely that manufacturers of passenger cars ever were forced to explore the real potential for exterior noise reduction.

The situation is somewhat different for heavy vehicles. There, encapsulation and screening have been used extensively to adapt to tightened limits and modified test procedures. Technology solutions are available, but might demand that exterior noise properties are taken into account in the very early design phase.

Heavy vehicles are built in modular systems and stricter noise limits may necessitate basic changes in the components; engines, transmission gears, etc. Substantially stricter noise limits must therefore be set in a very long time perspective.

Conclusion IV

The potential for reducing tyre/road noise is distributed between tyre and road. For the tyre the following can be concluded:

- Exploiting the spread of noise emission from tyres on the market one might identify a potential for reduction of tyre noise by 2-3 dB.
- Although there is a potential, it might be difficult to utilise this, having in mind all the different properties required from tyre performance.
- Focus and resources should be given to develop quiet and safe tyres with low rolling resistance.

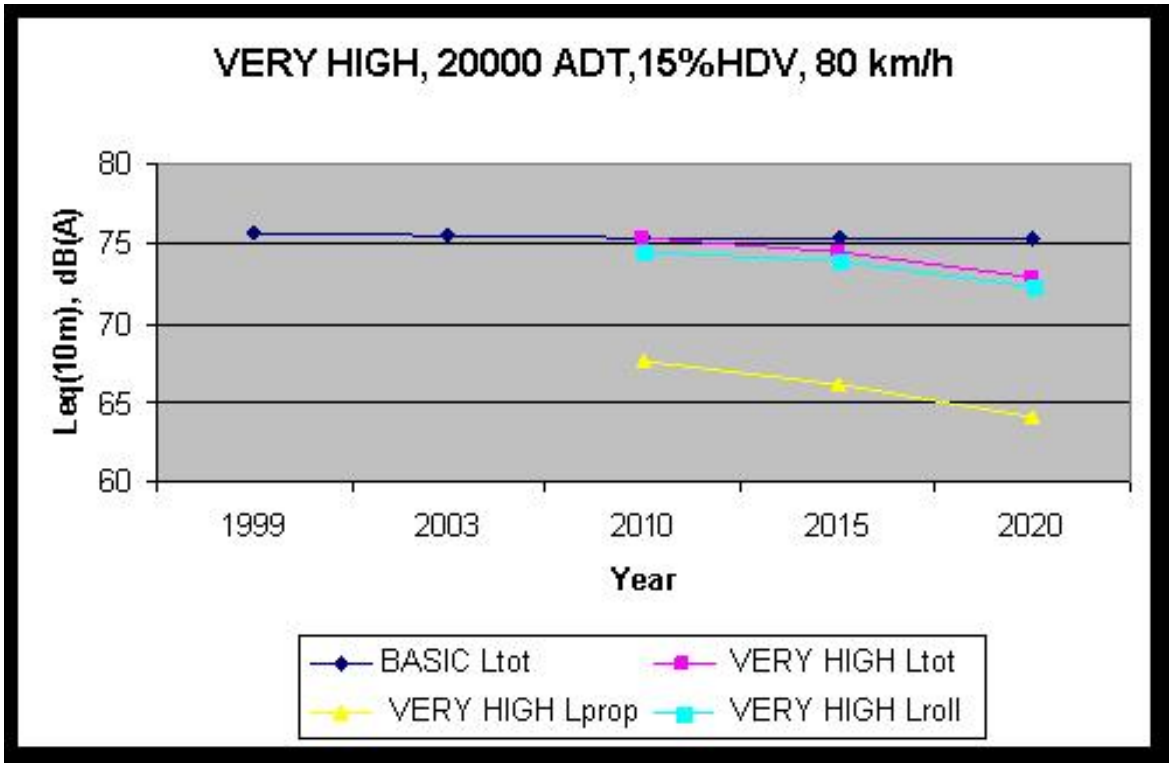
With 2-3 dB reductions for the tyres, 3-4 dB are required from the road surface.

Do we have time?

Considering the necessary lead times for industry and road owners to meet stricter noise limits and the additional time it takes until all vehicles, tyres and road surfaces fulfil stricter requirements, it takes decades to achieve a few dB lower equivalent levels also with high ambitions regarding sharpened limits.

On the other hand, if the process towards lower noise technology is not speeded up within the UNECE and among the road owners, the traffic noise situation will rather continue to get worse than better at all during the next 10 to 20 years.

Very high ambition:
6 dB(A) reduction of engine noise and 4 dB(A) reduction of tyre/road noise:



Noise reduction (Leq), Ltot (2020): - 2.4 dB(A)

Final Comment

Fuel consumption and Noise reduction have to be considered simultaneously, otherwise

suboptimised products
road traffic can not be considered as sustainable

Top speed limits and less focus on high performance with respect to handling as well as on fashion criteria will definitely open for

- less fuel consumption
- the development of quieter tyres beyond the technical potential of today
- the development of quieter vehicles beyond the technical potential of today

Thank you for your attention!