

Breaking the Sound Barrier

Why environmental noise is still not reduced properly, and what to do about it

E. Verheijen, J. Jabben

National Institute for Public Health and the Environment RIVM, Email: j.jabben@rivm.nl

Introduction

Various international cost-benefit studies show that traffic noise can be reduced cost-effectively by noise measures [1-6]. A quieter environment leads to less annoyance and sleep disturbance, resulting in reduced health damage and production loss [7-9]. This does not only justify the present national noise policy which aims at avoiding noise growth by noise emission ceilings, but also suggests that much more ambitious goals are within reach. In the Netherlands, about 2300 DALYs per million people are concerned with adverse health effects of traffic noise [8]. An overall road noise reduction of 4 to 8 dB can be achieved cost-effectively [5]. The message is obvious: noise reduction pays. However, the results of these studies appear not to generate much interest among policy makers and politicians. In this paper we summarize the methods and results, we will discuss why the message is still ignored and finally we provide ideas to take the noise issue higher on the political agenda.

Monetizing noise effects

In the valuation of noise effects from new economic activities and opposing noise policies, it is relatively easy to determine the costs of the proper noise measures. The benefits however are often only described as 'it will lead to a better life quality', 'less annoyance is to be expected' or, 'noise limits will be fulfilled'. This makes it difficult for decision makers, who often are laymen in the field, to fully incorporate environmental consequences and treat these on an equal standing with economic interests. For this reason, in the past years methods for monetizing noise effects have been developed and have received increasing attention both from policy makers and researchers. Generally three different approaches are followed to derive the benefits of noise reduction. These will be clarified hereafter.

Contingent valuation

Contingent valuation (CV) is an economic technique for the valuation of non-market resources. It is often used to assess the impact of environmental contamination. In this method the benefits of noise are expressed as N euro per household per year, per dB. The value N is found by asking respondents what they would be willing to pay for a lower noise level. While N ranges between 2 and 99 euro in different studies (see [10]), DG Environment proposes a value of 25 euro [11]. With this value, the total yearly benefits of 1 dB noise reduction per year can simply be derived as: N times the number of dwellings involved. It must be mentioned that a reduction below a certain noise level will not generate benefits any more. A commonly used threshold is 55 dB(A). For comparison of CV results with those of the hedonic pricing method discussed hereafter, the annual benefits should be summed over a period of about 30 years. By doing

this, references [5,6] show that the total social loss above the threshold of 55 dB(A) can be estimated to be 8.5 billion euro in the Netherlands (16.5 million inhabitants, area: 35000 km²).

Hedonic Pricing

Hedonic pricing (HP) is a method to estimate the value of non-market goods derived from building prices. It assumes that variations in building prices reflect the value of local environmental attributes. For example, houses in a silent environment appear to be more expensive than houses in a noisy environment. In this method the benefits of noise are expressed in the Noise Depreciation Index (NDI), which is a percentage of the building price per dB change, above a threshold value. For example, for road noise the NDI varies between 0 and 1% in different studies [6,10]. Generally it is assumed that the NDI determined for a certain area or country can be used in other areas of countries as well ("benefit transfer"). By doing this, it is shown that the total social loss above the threshold of 55 dB(A) is roughly 9.2 billion euro in the Netherlands [5,6].

Monitizing health damage

Placing values on human lives is becoming an increasingly used tool to allocate scarce resources. One of the methods used is to calculate Disability Adjusted Life Years (DALYs) [9]. The next step is to use an estimate of a 'value of a statistical life year' (VSLY) to translate DALYs into monetary values. Estimating the VSLY can be problematic, resulting in large differences between studies, see [12]. Nevertheless, rough estimates show that the health costs concerned with noise in the Netherlands are of the same order of magnitude as the results of the CV and HP methods [5]. These figures compare well with results for road noise in Denmark [8].

Sound Barrier

In spite of all the promising results, the recommended noise reduction has not yet been pushed up the political agenda [13]. Apparently, doubts about the validity of the estimations are responsible for this and on request of the Ministry of Housing Spatial Planning and the Environment the authors organised the workshop "Breaking the Sound Barrier" in October 2008. For this workshop, set up in cooperation with RebelGroup Advisory, ten economic consultants, independent researchers and policy-makers were invited to analyse the problem and discuss what actions are required to raise attention to the noise issue.

Analyzing the Sound Barrier

It was considered that, like in many environmental issues, tackling noise depends partly on EU legislation, which takes time to become effective. For instance, silent tyres are very

cost-effective [4] because the only action needed is to lower the limit for tyre noise emission. Though the automotive industry is willing to cooperate, they need a couple of years to realize the change. A really long-term process is the replacement of the braking blocks of freight trains. It is estimated that the EU policy here takes one or two decades before it really leads to noise reduction. National governments can stimulate retrofitting in several ways, but proper EU directives will probably be more successful.

Another reason to hesitate is found in the rather rough assumptions made in deriving the benefits. Though the three methods all point in the same direction, it is true that there are large uncertainty ranges. However, with an estimated break-even point around 11 billion euro (to be spent before costs are higher than benefits), a reasonably safe investment should be possible before the lower end of the uncertainty range is reached.

Some workshop attendees remarked that a message like this needs good timing and, moreover, a willingly messenger. Such an ambassador is more easily found if community noise is considered an important social issue. Probably, the long-awaited publication of a WHO report on this topic can help to support the message.

Another result of the workshop is the idea that the environmental ministry may not be the only department to address this message. As avoiding or reducing health damage is the main issue, the ministry of Health, Welfare and Sport is also a candidate. Also, part of the investments can be expected to be returned in terms higher productivity and performance. This would imply that the ministries of Finance and Economic Affairs should be involved as well.

Breaking the Sound Barrier

The workshop concludes that the message by itself is clear: noise reduction pays. The robustness of the message can be improved slightly, although the uncertainties and assumptions are not considered to be the main problem. It may be interesting to start with a local pilot project to demonstrate that the assumptions are right.

Furthermore, as the benefits of the investments in noise abatement measures will be shared by several departments, it is obvious to involve these other departments as well. This will certainly improve the chance to find the resources needed to realize the noise reduction and to mobilize willingness to push the issue up the agenda.

Acknowledgements

The authors acknowledge the Ministry of Housing Spatial Planning and the Environment in supporting the workshop. Without the suggestions and recommendations of the workshop attendees this analysis would not have been possible: Peter Blok (RebelGroup), Hans Nijland (PBL), Femke de Jong (CE), Miriam Weber (DCMR), Lauri de Boer (Bureau De Boer), Gijs Moonen (Min. Transport), Dik Welkers and Rutger Pol (Min. of Environment) and Mark Lijesen (VU).

References

- [1] H.A. Nijland et al., Costs and benefits of noise abatement measures, *Transport Policy* Vol.10 (2), pp. 131-140, 2003
- [2] M. Lijesen, W. van der Straaten, J. Dekkers, R. van Elk, *Geluidsnormen voor Schiphol – Een welvaarts-economische benadering*, CPB Document, ISBN 90-5833-273-X, 2006
- [3] L.C. den Boer, A. Schrotten, *Traffic noise reduction in Europe – Health effects, social costs and technical and policy options to reduce road and rail traffic noise*, CE Delft, August 2007
- [4] FEHRL Report, Final report S12.408210 Tyre/road – volume 1
- [5] J. Jabben, C.A.M Potma, S. Lutter, “Baten van geluidmaatregelen” RIVM report 680300002, Bilthoven (2007)
- [6] J. Jabben, Benefits of noise measures in the Netherlands, *Proceedings of Inter-Noise*, paper 399, Istanbul, August 2007.
- [7] B. Berglund, T. Lindvall, D.H. Schwela (eds), *Guidelines for Community Noise*, World Health Organization, 1999
- [8] H. Bendtsen (DRI), B. Kristensen (DEPA), A. Ohm (COWI), 2005
- [9] A.B. Knol, B.A.M. Staatsen, Trends in the environmental burden of disease in the Netherlands, RIVM report 500029001, Bilthoven, 2005
- [10] J. Nellthorp, A. Bristow, B. Day, Cost-benefit values for surface transport noise: derivation, application and international comparisons, *Proceedings of Inter-Noise*, Istanbul, August 2007.
- [11] WG of Health and Socio Economic Aspects (HSEA), *Valuation of Noise*, December 2003
- [12] P. Hofstetter, R. Müller-Wenk, Monetization of health damages from road noise with implications for monetizing health impacts in life cycle assessment, *Journal of Cleaner Production* 13, pp.1235-1245, 2005.
- [13] P. de Vos, An estimate of the global exposure to environmental noise, *Proceedings of NAG/DAGA 2009*, Rotterdam, March 2009.