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NOISE ABATEMENT PLANS AND ENVIRONMENTALLY COMPATIBLE URBAN TRANSPORT - PRACTICAL EXPERIENCES IN GERMAN TOWNS

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ABSTRACT

Since 1990, the German Federal Immission Control Act obliges local authorities or other responsible administrative authorities to state harmful environmental effects caused by noise and to draw up Noise Abatement Plans (NAP). The legal and organizational framework of NAP is described and the practical experience from several towns and cities is reported. As traffic is the most important source of noise impact, NAP has to be linked to urban transport planning in order to solve the problems. In general, NAP initiate environmental compatible urban and transport policies in Germany.

1 - INTRODUCTION

In 1990, the German Federal Immission Control Act has been revised. Since, German local authorities have to state actual and future harmful effects on the environment caused by noise and under certain conditions they have to set up Noise Abatement Plans (NAP). Essential elements of NAP are

- assessment of actual and future noise impact on the environment (noise monitoring) and of the extent of harmful effects, especially danger to health, considerable annoyances or considerable disadvantages (e.g. to proprietors of real estate)
- identification of essential noise sources and their contribution to noise impact
- actions to be taken in order to reduce noise impact.

The revised Federal Immission Control Act provides no additional regulations in order to prepare and execute actions, but it urges the authorities concerned, to make full use of all existing regulations and instruments in an intelligent way according to a co-ordinated plan.

2 - REGULATIONS AND INSTRUMENTS FOR NOISE ABATEMENT PLANNING

There exist already some useful regulations and instruments in Germany, which enable local or regional authorities or the Laender (=states) authorities to take actions against noise:

- Concerning **noise from industrial or commercial plants**, German legislation and the execution of laws by the Immission Prevention Agencies of the Laender is very efficient. In fact, in Germany, noise from industrial or commercial sites is no important topic in NAP. **The main problems today are caused by traffic noise.** In this field, the legislation and the application of existing regulations still need improvement.
- Especially the legislation on the **noise from airdromes** does not provides effective protection against noise impact. It will be revised during the next two years.

- The legislation on noise protection in case of the **construction or considerable extension of roads and railways** and in case of **new housing areas**, in principle, is quite sufficient, but the application of the regulations by local authorities sometimes lacks efficiency. Therefore, new problems are created, because during the planning process, noise very often is not taken into account from the beginning but only at a very late state of planning, when important decisions on the position and orientation of roads and buildings have already been taken and measures in order to reduce noise impact would be impossible or very expensive. The duty of noise prognosis in the framework of **NAP** has already improved many town development plans from the very beginning.
- **In respect to all roads and railways, which are newly built or considerably extended, noise prevention is obligatory for all institutions responsible** (Federation, Laender, local authorities). For the purpose of noise prevention in the vicinity of **federal** roads, highways and railways, during the last twenty years, more than 2 billion EUROS have been spent from **federal** budget for the purpose of noise barriers and sound isolating windows.
- There is no explicit regulation on the reduction of noise impact at **existing roads and railways**, but the Federation (and also some Laender and several towns, for a limited period of time), voluntarily grant a certain budget for the purpose of noise barriers and noise isolating windows, in order to reduce the problems, which lie in their responsibility:
 - Concerning the noise from old **federal** roads and highways, during the last twenty years, more than 500 million EUROS (ca. 25 million EUROS p.a.) have been spent from the federal budget.
 - The problem of existing **federal** railways has not been tackled for many years. As the technical standard of German rail infrastructure and vehicles is not satisfactory at all, the sites affected suffer from extreme impacts. Finally, in 1999, the federal government decided on a budget in order to reduce noise impact from federal railway tracks in highly exposed sites (25 million EUROS p.a.).
 - Local **NAPs** might supply additional arguments in order to obtain high priorities with respect to these federal noise reduction programs. Furthermore, the plans might procure proposals for a co-ordination of measures at federal roads or railways with measures at other noise sources in order to increase the overall efficiency.

Though regulations concerning **traffic noise from existing local or regional roads** are not completely satisfactory, local or regional authorities can further reduce noise impact by optimization of traffic infrastructure and traffic management, including traffic restrictions according to the Road Traffic Code. Urban and regional planning may even reduce the need for motorized traffic by improving the infrastructure in housing areas and by generating a new mix of housing, public services and those commercial activities which are not or only slightly disturbing (e.g. offices, neighborhood shops). **NAP** will improve and accelerate the development of ecological town development plans and ecological urban traffic plans.

3 - DEFINITION OF TARGETS FOR NOISE ABATEMENT PLANNING AND PRACTICAL SUPPORT BY THE LAENDER

The Federal Immission Control Act does not fix any thresholds with regard to noise immissions which are assumed to cause harmful effects on the environment nor targets for noise reduction. In the German legal system, in many cases, federal laws only provide a general framework. The regulation of further details is left to the authorities of the Laender who have to execute the laws and who have to instruct the local authorities, under which conditions they have to start **NAP**.

For the sake of efficiency and equal quality of life in all German regions, an assembly of the **Immission Control Authorities of the Laender (LAI)** gave recommendations on

- threshold values which are assumed to cause harmful effects on the environment (Table 1)
- how to handle the superposition of the impact of several different noise sources
- how to monitor noise by noise mapping and how to assess impact by "conflict mapping"
- useful legal instruments and promising activities which are at the disposal of local or regional authorities.

Threshold Values for Harmful Effects of Noise			
Equivalent Noise Level day / night (/ *24 h) [dB(A)]			
	Road / Rail	Aircraft	Industrial/Commercial Plants / Sports
Hospital areas	57 / 47	62*	45 / 35
sensitive housing	59 / 49	62*	50 / 35
general housing	59 / 49	62*	55 / 40
mixed areas	64 / 54	62*	60 / 45
according to	16. BImSchV	Legislation of the Laender	TA-Lärm, VDI 2058, 18. BImSchV, DIN 18005
Musterwaltungsvorschrift des Laenderausschusses für Immissionsschutz (LAI) , April 1992			

Table 1.

These recommendations have been carried over to administrative directions by which the Laender advice their local and regional authorities on **NAP**. Additionally, these directions define the responsibilities and duties of local or regional authorities and certain institutions of the Laender respectively, and indicate the practical support the Laender intend to yield to the local authorities in the framework of **NAP**. Some Laender offer consulting or grant subsidies for the purpose of noise monitoring, action planning or even for certain investments.

In particular, the Laender of Lower Saxony, Saxony-Anhalt, Brandenburg (and since 1996 North Rhine-Westfalia) accompanied and supported their local authorities during **NAP** very carefully and systematically. Thus, experience was gained and the planning process and the development of measures could be optimized continuously. In the framework of workshops organized by the Laender-Ministries of Environment, the information gained was transferred to the local staff responsible for **NAP**, town planning or traffic planning. As a result, most towns with more than 20.000 inhabitants in these regions already started **NAP**.

Nearly all other Laender followed the examples, though some with lower intensity or time delay. A survey in 1999 showed, that at least 350 towns (i.e. 50 % of all German towns with more than 20.000 inhabitants) were already occupied with **NAP**.

4 - PRACTICAL EXPERIENCE FROM NOISE ABATEMENT PLANNING

Anticipating the revision of the Federal Immission Prevention Law, in 1988 the Federal Environmental Agency in cooperation with the Ministry of Environment of the Land Niedersachsen (Lower Saxony) initiated model projects on **NAP** in the towns of Lingen on Ems, Nienburg on Weser and Celle. After the reunion of Germany, in 1992 an additional model project was started in the town of Brandenburg, also in cooperation with the Land Brandenburg.

In the framework of these model projects the towns got advice and financial support. They were accompanied during noise monitoring, problem analysis, development of action plans and execution of the first measures.

It was not intended to grant extra subsidies to the model towns in order to finance the measures. The towns were urged to integrate the measures into their "normal" investment or maintenance budget or to apply for "normal" subsidies from different federal or regional programs already existing (e.g. for the purpose of town or traffic infrastructure development or the economical development).

Practical results and experiences from these model projects influenced the Laender directions mentioned above and inspired many towns for their proper plans and actions.

Some important results from the model towns and other towns following later are

- In order to draw up efficient **NAPs** and in order to avoid a shift of problems from one edge of the town to the other, it is indispensable to assess the impact of noise for the whole area of the town. In order to limit expenses, simplified methods of noise monitoring were developed.
- Experience with simplified methods in more than thirty towns showed, that depending on the local situation, the depth of investigation and the data basis already available, expense for noise monitoring will range between 0,25 EURO and 1,00 EURO per inhabitant, the time necessary will vary between six and twelve months.
- Results from noise monitoring are

- **noise maps** showing the distribution of noise immissions from one or several sources in the urban area
 - **noise conflict maps** indicating those parts of the urban area, where noise levels from one or several sources exceed the critical threshold values mentioned above
 - **lists of noise indices** for streets or areas, compiling the extend of noise conflicts under consideration of the number of people affected respectively
- Action planning (including public discussion, coordination between different local or regional authorities and official decision making) will take another six to twelve months or even more, depending on the situation. First simple measures like speed reductions to 30 km/h or lorry bans in certain roads may be put into practice one or two years after the start of **NAP**. More complicated or expensive measures will follow step by step in a coordinated way during the following years.
- Action plans normally include
 - noise reductions targets for various sites and for the whole town
 - a description of the actions intended on short, middle or long term covering a time period of five, ten or even more years
 - a prognosis of the effects of measures on noise impact
 - a survey on the probable expenses for each measure and the intended way of financing, including subsidies from different sources
 - the legal framework for each measure
 - (a ranking of priorities, if necessary)
 - a specification of the local or regional authority responsible for each measure and of other institutions which may have to cooperate
- Typical actions in the responsibility of towns are
 - slow down of high speed traffic in urban main roads, traffic calming in streets
 - improvement of the pedestrian and biking infrastructure and of public transport (including improvement of urban rail infrastructure and promotion of low noise vehicles)
 - parking management, parking restrictions
 - management of freight traffic and the distribution of goods in the inner city
 - lorry bans in sensitive roads, sometimes with exception of low noise vehicles
 - general traffic bans in very sensitive streets (with exception of defined groups of users e.g. public services, cabs, the inhabitants of the very street)
 - diverse instruments of town planning (e.g. noise zoning in commercial or industrial areas adjacent to housing areas, noise isolating buildings in the vicinity of main roads and railways, positioning of less sensitive functions in the vicinity of noise sources)
 - subsidies to proprietors of real estate for the installation of noise isolating windows
 - noise barriers – *if technical possible and if there is a duty to or a funding for*
 - proposals for actions of external public authorities (e.g. traffic calming or traffic management on federal roads leading through the inner city, bypasses for federal or regional roads through less sensitive areas) and appeal for improvement in the vicinity of federal railways and air-dromes. The external authorities are obliged to consider the proposals and they may submit proposals on their own. Sometimes, this is the starting point of a very fruitful discussion process. In Nienburg the results were traffic calming, improvement of pedestrian facilities and biking lanes on two important federal roads.
- Further innovative actions are
 - Far-sighted town development planning in order to reduce the need for traffic (e.g. the City of Leipzig is working out strategies to improve the distribution of shopping centers in the inner city and in the most important housing areas in order to promote shopping by walking, biking and public transport).

- Policies to promote housing without an own car for every household. The City of Halle, in the framework of a model project, tries to transform an existing housing area into a "car-reduced zone", by promoting car sharing, biking facilities and special services for the inhabitants. Additionally, public transport is improved and traffic calming or punctual traffic bans in the neighborhood are installed.
 - The town of Pritzwalk has built a pedestrian bridge linking directly the town center to an important housing area on the other side of the brook. This bridge avoids a lot of car traffic. As the bridge had been constructed in the framework of an exercise of the Technical Aid Corporation, the town had only to pay for the building materials.
 - The city of Oberhausen and several towns in the Land Brandenburg found a low cost solution against noise impact from federal railways. In order to establish noise barriers, they permitted building contractors to deposit soil out of building sites along certain railway lines under the condition that the soil would be sufficiently clean and that the resulting barrier finally would be planted and maintained by the contractors. To the contractors this action spares the dumping fees, which are quite considerable.
- Model calculations in several towns (e.g. Nienburg, Celle, Berlin) showed up, that by a combinations of many punctual low cost measures, the level of road traffic noise could be reduced within the whole main road network by 1 to 5 dB(A), without increasing noise levels elsewhere. This is the same order of magnitude of noise reduction effect which could be obtained by constructing new bypasses.
 - In the town of Celle, **during the last ten years, one third of the whole main road network** has been treated by constructional or organizational measures. Investigation of noise levels by measurement resulted in noise reduction between 1 and 5 dB(A), as predicted by calculation. Measures at the other main roads will follow step by step, according to the normal road maintenance program.
 - Supplementary expenses for this kind of low cost measures in the responsibility of our model towns (with 50.000 to 100.000 inhabitants) ranged in the order of magnitude of 100.000 EUROS p.a.. For the financing of more expensive investments in later years in their own responsibility they successfully applied for subsidies. Additionally, in Nienburg, the federal road management paid for the measures on federal roads in the framework of the normal federal road maintenance program.
 - In Celle, the actions taken at the main road network were only part of an overall walking and biking promotion program. Additional, very comfortable biking lanes were installed far from main roads in order to link important housing areas to schools and recreational or commercial areas. Traffic calming in new housing areas is obligatory. As a result, in Celle during the last years, traffic from private cars did not increase any more. There might even be a slight decrease.

The experience of ten years of **NAP** shows, that in order to be successful, it is indispensable to link **NAP** neatly to town development, traffic planning and even Local Agenda 21 activities. In this framework it is also possible, to apply for various kinds of subsidies. This strategy has been followed systematically in **56** towns in the Land Brandenburg, and it proved well in many other towns (e.g. Nienburg, Celle, Brühl, Taucha, Heidelberg, Köpenick, Greifswald, Cottbus, Berlin), too. We hope, that experience with **NAP**, will inspire many towns in and outside of Germany.

Recently, the Federal Environmental Agency initiated a new model project at regional level in order to solve noise problems which can only be tackled by cooperation of a number of local authorities. Furthermore, this project shall serve to gain experience on planning methods and strategies which could be useful for villages and small towns.