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Status of noise abatement measures for roads in Switzerland

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In 2006, a comprehensive study on the status of noise abatement measures for all roads was carried out in Switzerland for the first time. This survey recorded the costs of remedial work and noise protection measures completed to date (approx. CHF 1 billion) or still outstanding (approx. CHF 3 billion). An account is also given of the distribution among different types of measures, and of the protective effects on the public. In addition to indicating the financial resources required for remediation of the Swiss road network on schedule, the survey highlights measures for controlling noise emissions at source which need to be implemented urgently.

1 Introduction

Since the Noise Protection Ordinance (NPO) entered into force on 1 April 1987, owners of roads have been legally obliged to remediate sections of roads which cause excessive noise pollution. Since then, all cantons have established a specialist service which is responsible for implementing road noise abatement measures.

However, it has not been possible to meet the deadline initially envisaged for the 2002 remediation, on the one hand because of the amount of remedial work to be performed – especially in urban areas – and on the other hand because of the limited resources made available for this task by the cantons.

The remediation periods have therefore been extended within the framework of the revision of the Noise Protection Ordinance of 1 October 2004. In parallel, a periodic progress report on remedial work and noise insulating measures has been introduced, which serves as a basis for the necessary resource planning.

An initial study carried out in 2006 on a national scale by the Federal Office for the Environment FOEN with the support of the Federal Roads Office produced an inventory of the noise abatement projects which had been completed, which were in progress or which were still outstanding within the remediation periods (2015 for highways and 2018 for other roads).

This study concentrates on the following parameters:

Topic	Data collected
Financial requirement	Financial requirement per annum, total cost, federal subsidy…
Situation relative to limit values	Number of buildings and persons where limit values were exceeded before/after remediation
Measures	Data concerning road pavement, speed reductions, walls, tunnels, measures on buildings
Effectiveness	Number of buildings with a reduction in noise level

Table 1 Inventory

2 Status of road noise abatement in Switzerland 2006

The total cost of noise abatement on Swiss roads, up to the end of the remediation periods (2015 for highways and 2018 for main roads and other roads), is approximately CHF 4 billion, about 50% of which is for highways. Remedial work on highways is currently at the most advanced stage.

Since 1985, approximately CHF 1 billion has already been spent, three-quarters on highways and one quarter on main roads and other roads (Fig. 1).

To date, 85% of resources have been used for structural measures on the propagation path, i.e. noise protection walls and tunnels. The remainder has been used to finance subsidiary measures on buildings, such as noise insulating windows.

On average, remediation of Swiss roads costs approximately CHF 0.5 million per kilometre. The costs for highways are more than four times higher.

Some 600 noise abatement projects have been completed. It is estimated that approximately 170,000 people are benefiting from the measures implemented within the framework of these projects, i.e. from a sound level reduction of at least 1 dB.

3 Perspectives

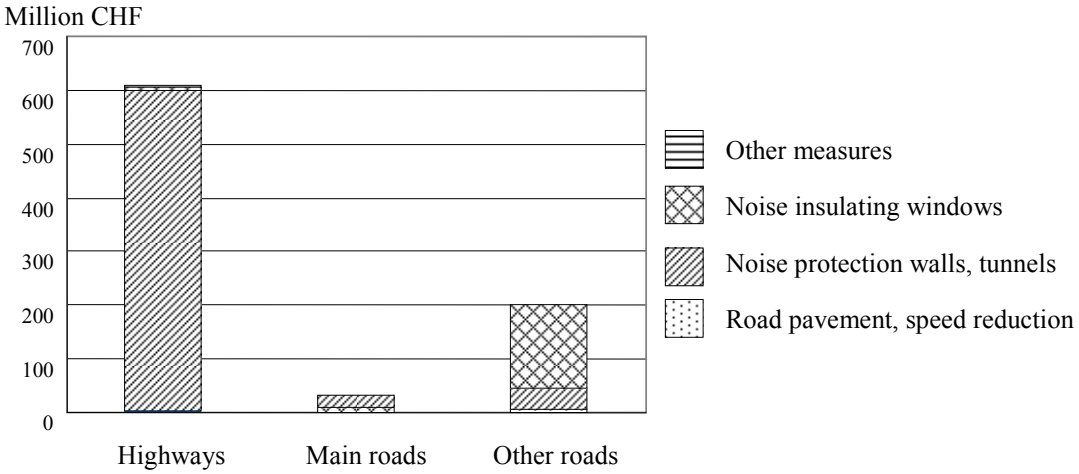
3.1 What costs?

The remaining remedial work demands resources of approximately CHF 3 billion, CHF 1.4 billion of which are necessary for projects in the design or implementation phase (Fig. 2). It is estimated that the measures resulting from the projects in progress will benefit some 300,000 people and a similar proportion will be affected by the projects to be implemented by 2015 and 2018 respectively.

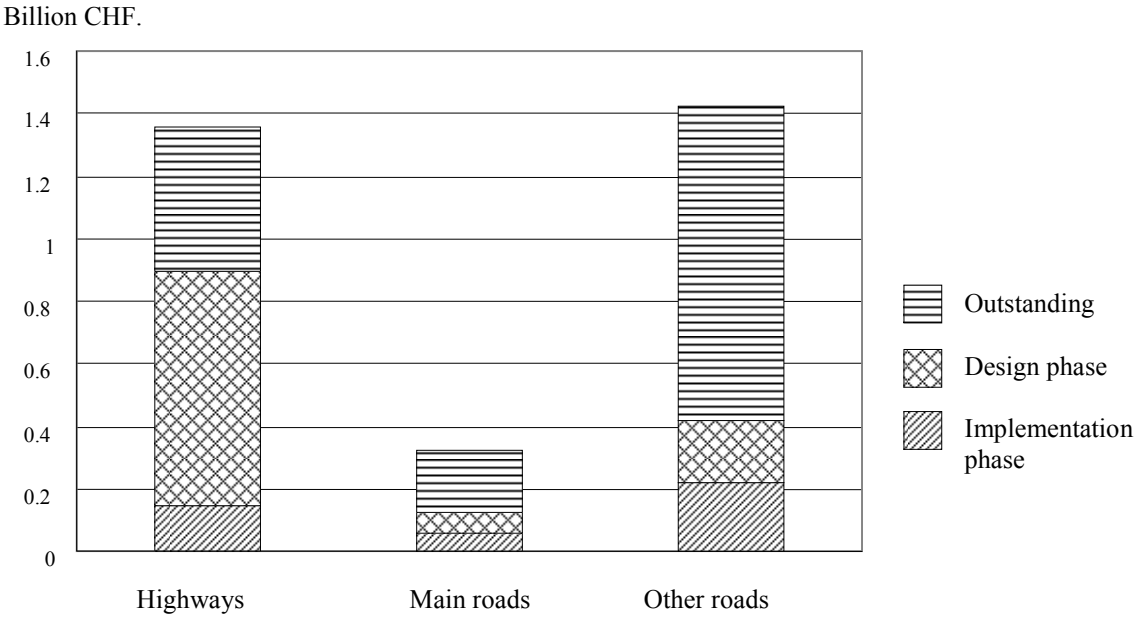
Proportionally, abatement is the most advanced at the level of the highways. It requires a financial expenditure of practically CHF 2 billion for the period from commencement in 1985 up to the end of the period, on 31.03.2015. Of this sum, 611 million (31%) has already been spent, whilst abatement projects in progress will cost 896 million (46%).

'Other roads' constitute the greatest challenge. To date, the public authorities have invested CHF 200 million in noise protection, i.e. 12% of the requirements costed at CHF 1.6 billion. In addition, 417 million (26%) relate to projects in progress.

The study demonstrates that up to the end of the remediation periods the requirements amount to between CHF 200 and 400 million per annum. Even though the rate of remediation has markedly increased since 2002 (CHF 100 million per year for the last 5 years), financial resources will still have to be at least doubled if it is desired to complete noise abatement within the specified deadlines, by 2015 (highways) and 2018 (main roads and other roads). This trend towards a major increase in annual expenditure can be observed for each of the road categories; the increase in resources is the greatest for other roads.



,Fig.1 Resources spent to date (completed projects).



,Fig.2 Future road noise abatement costs.

3.2 What types of protections?

Until now, some 85% of the resources applied have been used for measures on the propagation path, i.e. for noise protection walls and tunnels. Only about 1% of resources have been used for measures at source, i.e. the replacement of existing road pavements or speed reduction measures (Fig. 3).

Measures at source, such as the laying of low-noise pavements or reductions in speed, must be further encouraged. This type of measure reduces not only noise but also costs; it is therefore of great interest from the economic point of view. In comparison with their cost (less than 3% of investments), the number of persons benefiting from low-noise pavements is high (8-18% of people depending on the road type), since this measure acts on the source and not on an ad hoc basis and it reduces the pollution throughout the surrounding area. Conversely, noise protection walls and tunnels have a greater effect in terms of decibels, but this is limited to the screened zone for which protection is required and to the buildings located within it.

Noise insulation measures on buildings show a significant upward trend. For completed projects, though the proportion of expenditure agreed for noise insulating windows is only 14%, it is 32% for the projects in progress. Thus a third of the resources devoted to noise abatement in the future will be used to finance noise insulating windows.

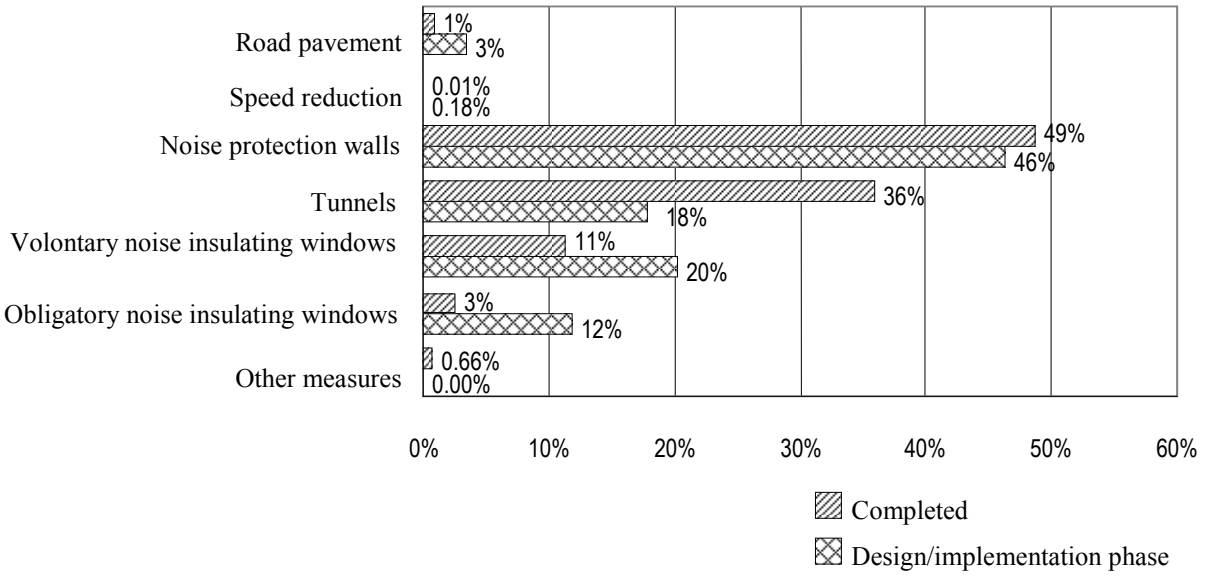


Fig.3 Distributions of investment according to type of measure.

5 Conclusion

To date, considerable resources have already been invested in road noise protection in Switzerland. The task at present is to concretise the knowledge acquired from the 2006 study on the basis of the current plans, i.e.:

- to ensure finance for remediation
- to strengthen the implementation of measures at source and traffic management measures.

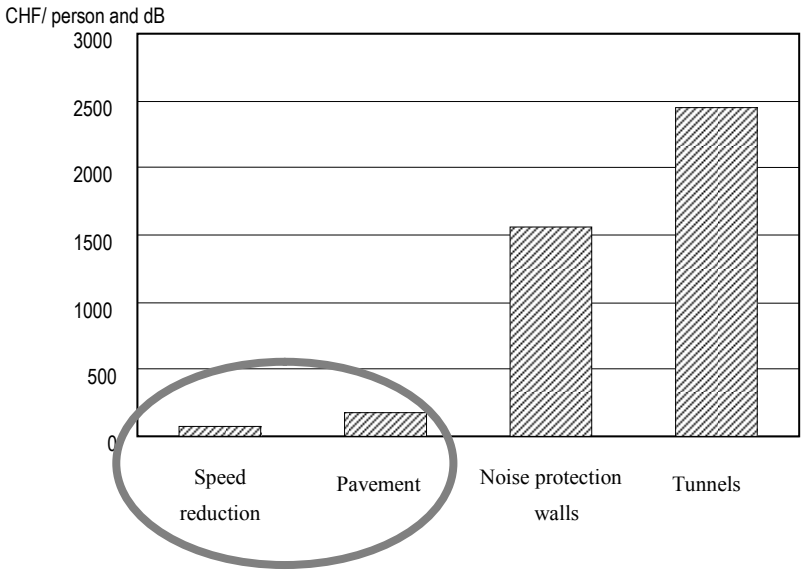
3.3 Provision of finance

Compliance with the legally stipulated deadlines for road noise abatement – 2015 for highways and 2018 for other roads – demands a considerable increase in financial resources and abatement activities on the part of the Confederation, the cantons and municipalities.

3.4 Promoting measures at source

Despite the successes achieved in road noise abatement, exposure to noise continues to increase because of an average annual increase in traffic of 1 to 2%, which occasionally negates the effects of the efforts made to date. Sustainable improvement cannot be achieved without a long-term reduction, or at least a ceiling on emissions.

An optimal abatement strategy therefore implies the priority implementation of measures which guarantee maximum protection whilst making the best use of the available resources. In this way the population will benefit from the best possible protection from excessive noise pollution. These two criteria favour the promotion of measures at source, in particular low-noise road pavements and traffic moderation. Measures at source are also the most economical (Fig. 4).



.Fig.4 Comparison of the cost of each type of measure.

In the future, it will be appropriate to consolidate the measures which limit emissions and measures at source, i.e.:

- promoting quieter vehicles and tyres
- promoting low-noise pavements
- promoting speed reductions, other traffic moderating measures and urban improvements
- promoting traffic planning and management systems (low-speed traffic, local/temporary bans on certain types of vehicles, systems which control the number of vehicles, etc.).

To achieve these goals, incentive programmes and regulations concerning emissions are necessary. These measures have not yet been sufficiently exploited.

In parallel, it will be appropriate to consolidate efforts in relation to area planning, traffic planning and urban planning. Increasing mobility in our society, the increase in leisure traffic in areas previously free from such traffic, the increasing density of infrastructures, urban sprawl and the increasing number of cars in Switzerland threaten the success of the remediation work and the reduction in noise emissions which has been achieved.