Conférence Européenne
des Directeurs des Routes

Conference of European
Directors of Roads

National Road Authorities' practice and experiences with preparation of noise action plans

March 2013

REPORT NOISE ACTION PLANS

Final Report, v2, 1 March 2013

Prepared by: CEDR Project Group Road Noise: subgroup noise action plans

Jakob Fryd (DK) subgroup leader
Ms Elena Sophocleous (CY)
Villu Lükk (EE)
Jacek Wojtowicz (PL)

Members CEDR Project Group Road Noise:

Klaus Gspan and Christof Rehling (AT)
Ms Barbara Vanhooreweder (BE-FL)
Ms Elena Sophocleous (CY)
Wolfram Bartolomaeus (DE)
Jakob Fryd (DK)
Villu Lükk (EE)
Jesús Rubio Alférez (ES)
Arto Kärkkäinen (FI)
Marc Di Martino and Emmanuel Le Duc (FR)
Ms Efterpi Giannopoulou (GR)
Vincent O'Malley (IE)
Ms Patrizia Bellucci (IT)
Guntis Graveris (LV)
Wiebe Alberts (NL) chairman
Nico Faber (NL) secretariat
Michiel Roebben (NL) secretariat
Ms Ingunn Milford (NO)
Jacek Wojtowicz (PL)
Kjell Strömmer (SE)

Approved and amended by: EXECUTIVE BOARD on

Addressed to: GOVERNING BOARD on

Executive summary

In 2002, Directive 2002/49 relating to the assessment and management of environmental noise was adopted by the European Parliament and Council. The Directive has subsequently been transposed into Member State national legislation. The Directive describes environmental noise as "unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity" (Directive 2002/49/EC, article 3). Ambient or environmental noise covers long-term noise, from transport and industry sources.

All EU Member States were obliged to prepare a first generation of noise action plans for road traffic in 2008. Currently, there are not many studies or evaluations of the work undertaken in the preparation of noise action plans at a European level. In order to be in a position to adopt a common approach and share knowledge within CEDR Member States, the CEDR Project Group Road Noise found it important to undertake research to establish how Member States adopted END. This required investigating how decisions (technical), especially in the areas of noise indicators, mitigation measures, public consultation and other aspects of noise action planning are taken into account in the preparation of noise action plans.

The basic idea of this report is to make practical knowledge sharing on the management of noise and noise abatement possible between the national road administrations and others. It is hoped that this report will provide guidance on how to achieve an even better approach to noise abatement in Europe for the benefit of the people living in close proximity to national road networks in particular and to all roads in general.

On the basis of results of a questionnaire among 19 CEDR members, the report describes and discusses experiences acquired from the first round of noise action planning, e.g. constraints and problems in preparing noise action plans, ideas, examples, solutions, strategies for noise abatement and the process of public consultation.

The report addresses issues such as:

- how the EU Noise Directive is implemented in Member States, including the extent of km of roads covered by noise action plans, costs for the preparation of noise action plans;
- the use of guidance notes for the preparation of noise action plans;
- noise indicators and noise limit values used in the noise actions plans;
- the use and definition of quiet areas;
- measures, criteria and strategies for noise abatement, including types of measures including in noise action plans, main criteria for selecting noise mitigation measures, budgets for noise control and use of cost-benefit analysis;
- involving the public in the preparation of noise action plans, including means of consultation, length of consultation and experiences from the involvement of the public;
- general experiences from the first round of noise action planning, including good and not so good experiences and recommendations for future work on noise action plans.

Based on our study, we believe that the following issues in relation to the preparation of noise action plans should be given special attention:

- clarification of the enforcement regime of action plans;
- guidance notes for preparation of noise action plans;
- development of useful methods to carry out cost-benefit analysis;
- need for a best practice guide on how to prioritize funds for noise control;
- targets to be achieved in action plans are not are not well described;
- definitions and guidelines for how quiet areas can be included in noise action plans;
- focus on involving the public;
- improve cooperation between stakeholders in the preparation of noise action plans;
- short timeline between strategic noise mapping and finalization of actions plans;
- lack of budgets for noise control.

The above are elaborated in Chapter 9, Conclusions and recommendations.

TABLE OF CONTENTS

List of figures and tables

1 Background

According to CEDR's strategic plan for 2009-13, the CEDR Project Group Road Noise among other objectives was requested to focus on issues related to the Environmental Noise Directive (END) principally noise mapping and action planning, and to outline to CEDR members constraints and solutions to these issues in a state-of-the-art report in 2013.

END (Directive 2002/49/C) requires EU Member States to:

- monitor the environmental noise problem;
- address local noise issues;
- inform and consult the public about noise exposure, its effects, and the measures considered to address noise.

This report focuses on noise action planning, namely, National Road Authorities practices and experiences with the preparation of noise action plans. The report describes the work of the CEDR Project Group Road Noise, and discusses experiences acquired from the first round of noise action planning, e.g. constraints and problems in preparing noise action plans, ideas, examples, solutions, strategies for noise abatement and the process of public consultation.

2 Project objectives and method

All EU Member States were obliged to prepare a first generation of noise action plans for road traffic in 2008. Currently, there are not many studies or evaluations of the work undertaken in the preparation of noise action plans at a European level.

It seems that decisions concerning the first round of action planning have varied significantly among several European National Roads Administrations (NRAs). In order to be in a position to adopt a common approach and share knowledge within CEDR Member States, the CEDR Project Group Road Noise found it important to undertake research to establish how Member States adopted END. This required investigating how decisions (technical), especially in the areas of noise indicators, mitigation measures, public consultation and other aspects of noise action planning are taken into account in the preparation of noise action plans.

This report contains the results of a survey that was conducted during the winter of 2010-11. It was anticipated that the attached questionnaire (Annex A) should be relatively straight forward for individuals who were responsible for the preparation of the first round of noise action planning.

The objective of the project is to contribute to the development and improvement of the National Road Authorities noise action planning, and to provide knowledge and information about how the preparation of noise action plans has been approached.

The basic idea of this report is to make practical knowledge sharing on the management of noise and noise abatement possible between the national road administrations. It is hoped that this report will provide guidance on how to achieve an even better approach to noise abatement in Europe for the benefit of the people living in close proximity to national road networks in particular and to all roads in general.

The CEDR Project Group Road Noise has conducted a survey among CEDR members where they were asked about their experience with the preparation of noise action plans in the first round of noise action plans covering the period 2008-13.

The objective of the project is to:

- contribute to the development and improvement of the National Road Authorities' noise action planning;
- pass on knowledge, suggestions and ideas for good practice during the preparation of the next round of noise actions plans due in 2013;
- discuss the experiences gained from the first round of END noise action planning, e.g. constraints and problems in preparing noise action plans, positive ideas and examples of solutions and strategies for noise abatement and how to undertake public consultation etc.

A questionnaire was prepared which was distributed to all CEDR members. The questionnaire can be seen in Annex A.

Out of the 25 Member States, responses were received from the National Road Authorities in 19 countries, namely: Austria, Belgium (both Flanders and Wallonia), Denmark, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland and United Kingdom. From Ireland we received responses from two local authorities, Fingal County Council and Dublin City Council because local authorities were assigned the responsibility of preparing action plans in the transposition of the legislation.

The survey results have been discussed by the CEDR Project Group Road Noise. The group members own experiences in the preparation of noise action plans have been included in the description and evaluation of the survey results.

3 The Environmental Noise Directives requirements for Noise Action Plans

In 2002, Directive 2002/49 relating to the assessment and management of environmental noise was adopted by the European Parliament and Council. The Directive has subsequently been transposed into Member State national legislation. The Directive describes environmental noise as "unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity" (Directive 2002/49/EC, article 3). Ambient or environmental noise covers long-term noise, from transport and industry sources. The main aim of the Directive is to provide a common basis for tackling the noise problem across the EU, focusing on four underlying principles.

Monitoring the environmental problem
Competent authorities in Member States are required to make 'strategic noise maps' for major roads, railways, airports and agglomerations, using harmonised noise indicators L_{den} (day-evening-night equivalent level) and L_{night} (night equivalent level). These maps will be used to assess the number of people throughout Europe that suffer from annoyance and sleep disturbance caused by noise.

Informing and consulting the public
The public needs to be informed and consulted on the exposure to noise and its effects, as well as the measures considered to address noise, in line with the principles of the Aarhus Convention.

Addressing local noise issues
Based on the noise mapping results, competent authorities are required to develop action plans to reduce noise where necessary and maintain environmental noise quality where it is at a favourable level. The directive does not set any limit values, nor does it prescribe the measures to be used in the action plans.

Developing a long-term EU strategy
This will include objectives to reduce the number of people affected by noise in the longer term, and will provide a framework for developing existing Community policy on noise reduction from source.

According to END Annex V, an action plan must at least include the following elements:

- a description of the agglomeration, the major roads, the major railways or major airports and other noise sources taken into account,
- the authority responsible,
- the legal context,
- any limit values in place in accordance with Article 5 a summary of the results of the noise mapping,
- an evaluation of the estimated number of people exposed to noise, identification of problems and situations that need to be improved,
- a record of the public consultations organised in accordance with Article 8(7),
- any noise-reduction measures already in force and any projects in preparation,
- actions which the competent authorities intend to take in the next five years, including any measures to preserve quiet areas,
- long-term strategy,
- financial information (if available): budgets, cost-effectiveness and cost-benefit assessment,
- provisions envisaged for evaluating the implementation and the results of the action plan.

4 Implementation and responsibilities

This section focuses on how the EU noise directive has been implemented in Member States. It addresses the NRA's responsibilities with regard to preparation of noise action plans, the length of road system included in noise action plans and what resources were required to prepare action plans.

4.1 NRAs' responsibilities in accordance to national legislation

In all countries the Environmental Directive has been transposed into national legislation.

Table 1 Have NAPs been prepared and was NRA responsible (status January 2011)

	Austria	Belgium F	Belgium W	Cyprus	Denmark	Estonia	Finland	Germany	Greece	Ireland	Italy	Latvia	Netherland	Norway	Poland	Slovenia	Spain	Sweden	United Kingdom
Have noise action plans been prepared for major roads in your country?	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+
Was the National Road Authority responsible for drawing up noise action plans?	+	-	+	-	+	+	+	-	+	-	+	+	+	+	-	-	+	+	-

+: yes, -: no

In 17 out of 19 countries, noise action plans have been prepared for major roads in accordance with the Environmental Noise Directive (status in January 2011).

In 12 out of 19 countries the NRA was responsible for drawing up noise action plans along major roads, defined as roads with traffic of more than 6 million vehicles per year.

In cases where the NRA was not the responsible agency for the preparation of noise action plans along major roads:

Either local authorities or the respective ministries of transport/environment ministries were responsible.

In two countries, Ireland and Norway, it is the local authorities who are responsible for the preparation of noise action plans along major roads. It is interesting to note that in Ireland, noise mapping bodies are not automatically identified as action planning authorities. Instead noise mapping bodies create noise maps on behalf of the relevant action planning authority. Inside the agglomerations the mapping and planning function will be within the same authorities.

Conversely, in the United Kingdom, it is a government department which is responsible for all noise action plans along all major roads even if the road is owned by a local authority.

It seems to be most appropriate that it is the same authority, which both manages and maintains the road, which should also prepare the noise action plan for the road. For example, it makes no sense that a local authority in its noise action planning lays down noise mitigation measures for roads which the local authority does not manage/own and vice versa.

On the other hand, it is important to consider community noise problems in an overall context. Having only one authority/organization that is tasked with developing a noise action plan covering all types of noise sources may lead to a better assessment of noise issues based on a holistic approach, including when and in which situations it would be optimal to take action against elevated noise levels.

The survey shows that the vast majority of NAPs do not take into account those situations where more than one noise source is present e.g., parallel infrastructures of different type or owner, crossings etc. Only the UK, Ireland and Italy gave consideration to this issue.

At this point, it seems highly relevant to discuss how the preparation of noise action plans are designed so that the planning of noise abatement measures are best addressed and to ensure that all noise sources are taken into account. END could clarify how noise action plans should consider this issue – one of the purposes of END is to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance due to exposure to environmental noise.

In the UK, requirements are set out in the NAPs that liaison needs to takes place between the 'owners' of the different noise sources and they will need to collectively consider how the 'Important Area/Important Area with First Priority Locations' should be addressed.

Dublin City in Ireland has defined a decision/selection matrix to identify areas to be subject to noise management activities [13]. The decision/selection matrix takes into account different types of noise (road, rail and airport) (see Table 6 on p. 27).

4.2 Km of Major roads managed by the national road authorities

In the first round of the END it was provided that Member States must carry out noise mapping and noise action plans along major roads. The Directive defines major roads such as roads with a traffic volume of more than 6 million vehicles per year. All countries have used the directive's definition of major roads. For the second round of END noise mapping and action planning END defines major roads, as roads with traffic of more than 3 million vehicles per day.

Figure 1 shows km of major roads mapped respectively in the 1st and 2nd round of END. It should be noted that there is no data available from approximately two thirds of the respondents regarding information about km road in the 2nd round of END.

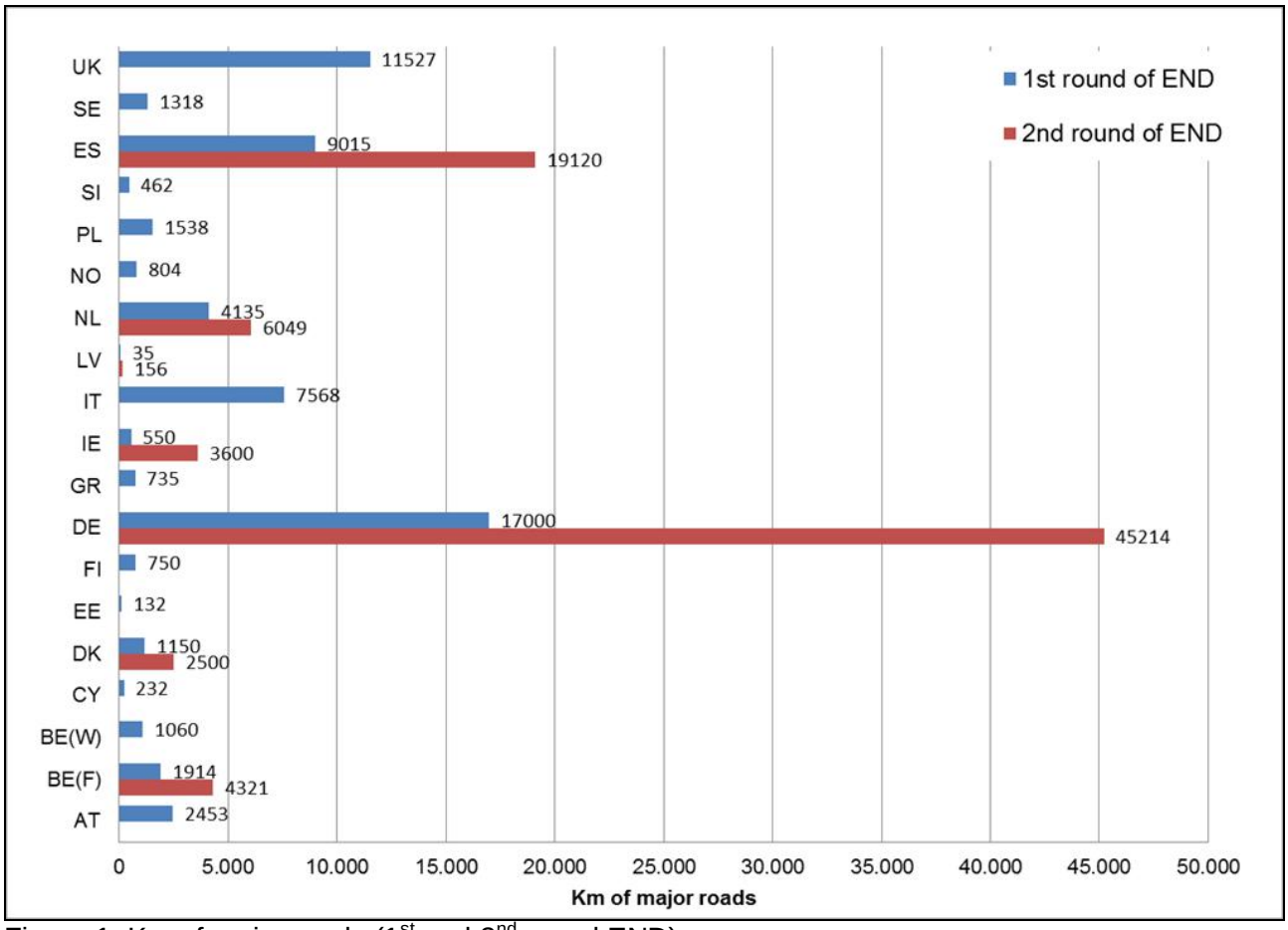

Figure 1 Km of major roads (1st and 2nd round END)

4.3 Costs and use of time on preparation of action plan

There is considerable variation both in terms of cost and time dedicated by NRAs in preparing noise action plans. There appears to be no correlation between the kilometres of road covered by the action plans and resources used in preparing such action plans.

Many of the first round noise action plans were completed for a cost ranging between EUR 25 000 and EUR 100 000. Only Finland and the Netherlands differ by significantly higher costs due to the acquisition of data and the deployment of consultants. Most Member States reported that they commissioned external consultants to help in the preparation of their noise action plan. The development time internally within organization varied from between 2 and 75 weeks.

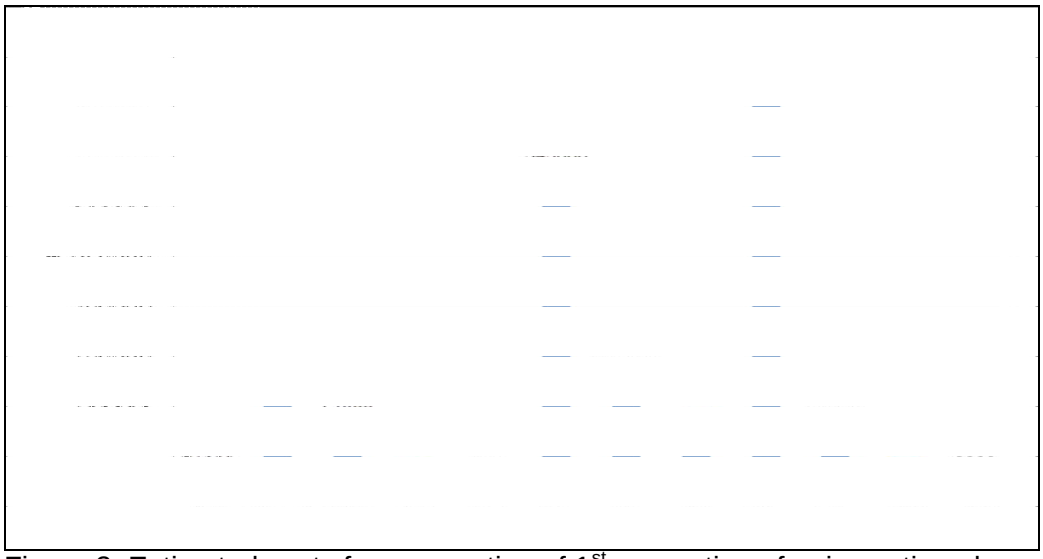

Figure 2 Estimated costs for preparation of 1st generation of noise action plans

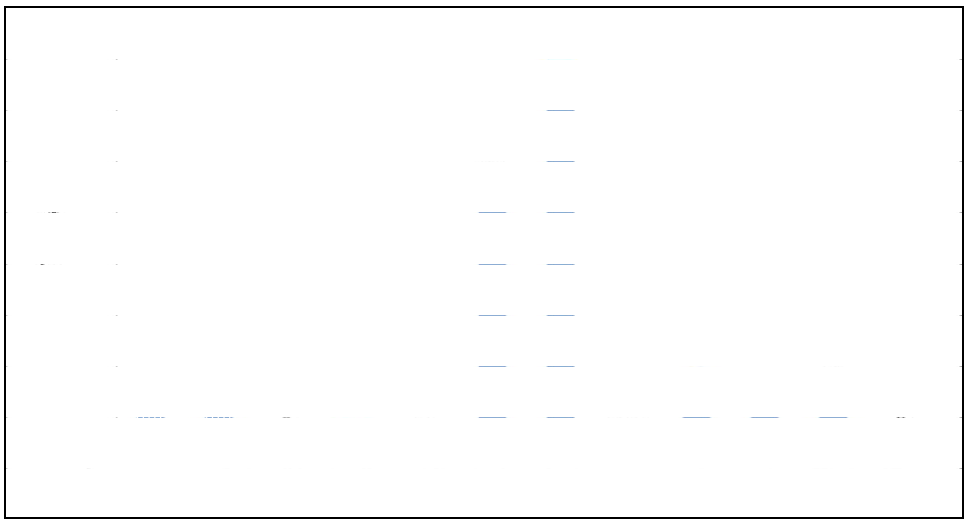

Figure 3 Estimated time consumption for internal work within the NRA for preparation of 1st generation of noise action plans

4.4 Guidance

The respondents where asked whether they used any guidance note for the preparation of noise action plans. In cases where guidance notes were used, the respondents were requested to provide a title or a link to the particular guidance document.

From the survey, it was noted that five Member States (Denmark, Ireland, Italy, Germany and the Netherlands) used a guidance note for the preparation of noise action plans.

Table 2 Guidance for noise action planning

Member state	Guidance note	Link
Denmark	Guidance from the Danish Environmental Protection Agency: Støjkortlægning og støjhandlingsplaner, vejledning nr. 4, 2006 (Noise Mapping and Noise Action Plans, guidance no 4, 2006)	http://www2.mst.dk/udgiv/publikationer/2006/87-7052-146-8/pdf/87-7052-146-8.pdf
Ireland	Guidance Note for Noise Action Planning For the first round of the Environmental Noise Regulations 2006, July 2009	http://www.epa.ie/downloads/advice/noisemapping/name,27056,en.html
Italy	UNI/TS 1137 – ACUSTICA – "Criteri per la predisposizione dei piani di azione destinati a gestire I problemi di inquinamento acustico ed i relative effetti" (Criteria to draw Up Action Plans to manage Noise Issues and Effects)	--
Germany	LAI-Hinweise zur Lärmaktionsplanung gemäß UMK-Umlaufbeschluss 33/2007 von der Umweltministerkonferenz zur Kenntnis genommen mit der Ergänzung zu ruhigen Gebieten entsprechend des Beschlusses zu TOP 10.4.2 der 117. LAI-Sitzung (LAI Notes on Noise Action Plan in accordance with UMK-circular resolution 33/2007 of the Conference of Environment Ministers noted with the complement to quiet areas according to Decision on Item 10.4.2 of the 117th LAI session)	http://www.umweltbundesamt.de/laermprobleme/publikationen/LAI-Hinweise_Laermaktionsplanung_2009.pdf
the Netherlands	Guidance from the Dutch Ministry of Infrastructure and the Environment: Handreiking Omgevingslawaai 2011 (Guidance Environmental Noise 2011)	http://www.polka.org/upload/files/handreiking_omgevingslawaai_2011.pdf
Other	Practitioner Handbook for Local Noise Action Plans, SILENCE	http://www.silence-ip.org/site/fileadmin/SP_J/E-learning/Planners/SILENCE_Handbook_Local_noise_action_plans.pdf
Other	Guidance on Noise Action Planning, Scottish Executive, 2007	http://www.scotland.gov.uk/Resource/Doc/196161/0052568.pdf)

The respondents were asked about their opinion on the need for a guidance note to support the preparation of noise action plans. Overall, the respondents replied that they felt there was a need for a guidance document to support the preparation of noise action plans.

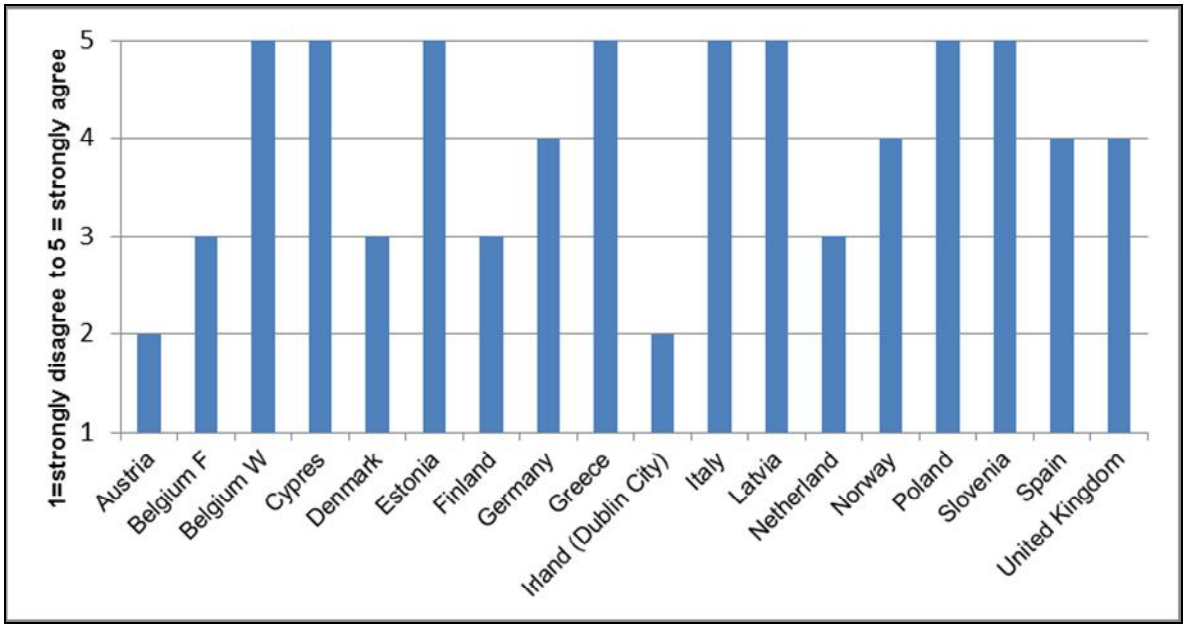

Figure 4 Need for a guidance document to support the preparation of noise action plans

12 out of 18 respondents stated (marked the boxes 4 or 5) that there was a need for a guidance note to support the preparation of noise action plans, while 2 indicated that there is of a requirement for a guidance note (marked the boxes 2). Four respondents indicated (marked the box 3) that they neither agree or disagree about the statement or disagree about the absence of a guidance note.

It appears that there is a requirement for guidance notes for the preparation of noise action plans. Variation exists between Member States in relation to how the Directive is implemented and it is possible to interpret the requirements of the Directive differently. Against this background, it is relevant to consider whether to establish associated guidance, at a national level, in relation to the regulations implementing the Directive.

5 Noise indicators

Article 5 in END introduces noise indicators for reporting but it does not set any legally binding EU-wide noise limit values or targets. Member States are required to report their national limit values in force or under preparation.

5.1 Noise indicators used in noise action plans

END prescribe that the selected common noise indicators are L_{den}, to assess annoyance, and L_{night}, to assess sleep disturbance. Member States is also allowed to use supplementary noise indicators in order to monitor or control special noise situations.

In END the noise indicator L_{den} is defined by:

$$L_{den} = 10 \cdot \lg \frac{1}{24} \left(12 \cdot 10^{\frac{L_{day}}{10}} + 4 \cdot 10^{\frac{L_{evening}+5}{10}} + 8 \cdot 10^{\frac{L_{night}+10}{10}} \right)$$

In which
- the day period (L_{day}): from 07.00 to 19.00;
- the evening period ($L_{evening}$): from 19.00 to 23.00 (Member States may, however, shorten the evening period by one or two hours and lengthen the day and/or night period accordingly);
- the night period (L_{night}): from 23.00 to 07.00.

All three periods combined, with an extra 5 dB for the evening period and an extra 10 dB for the night period, result in the equation for L_{den} in dB given by the END for the assessment and management of environmental noise.

END prescribe noise mapping in relation to noise exposure in and near buildings, the assessment points must be 4.0 ± 0.2 m (3.8 to 4.2 m) above the ground – in the case of measurement for the purpose of strategic noise mapping in relation to noise exposure in and near buildings, other heights may be chosen, but they must never be less than 1.5 m above the ground, and results should be corrected in accordance with an equivalent height of 4 m.

All countries have used L_{den} and L_{night} 4 m above ground, as prescribed by END in the preparation of noise action plans.

However, 7 countries indicate that they also have used other indicators:
- Denmark: L_{den} and L_{night} 1.5 m above ground
- Estonia: L_{day} or $L_{evening}$ were used to describe the situation, but were not used in selection of actions. Only L_{night} was used in that process, since Estonian national limit values are set for L_{day} and L_{night}. There is no limit value for L_{den}.
- Finland: $L_{Aeq7\text{-}22}$ (h=2 m), Finnish national limit values are given for L_{Aeq} day/night. This is the method which all Finnish previous assessments are based on
- Italy: $L_{Aeq,\ day}$ (4 m); $L_{Aeq,night}$ (4 m); day: 06:00-22:00; night: 22:00-06:00
- Latvia: L_{day} and $L_{evening}$
- Spain: L_{day}, $L_{evening}$
- Sweden: L_{Aeq} and L_{AFmax}

5.2 Noise limit values for road noise, which requires NRA to consider mitigation measures

Member States have taken a range of approaches. Some have legally binding noise limit values or are currently revising them. Others have guideline values in place.

The respondents were asked if exceeding the national noise limit values (binding or guiding) was used as a basis for the establishment of priorities for mitigation measures in noise action plan. *If yes,* they were asked to state the noise limit values for road noise, which requires National Road Authorities to consider mitigation measures. *If no,* they were asked to list up which noise levels or else, would require a National Road Authority to consider mitigation measures.

Table 3 Noise limit values used in noise action plan

Member state	Limit value
Austria	L_{den} = 60 dB, L_{night} = 50 dB
Belgium F	Existing roads: L_{den} = 70 dB and L_{night} = 60 dB, New roads: L_{den} = 60 dB and L_{night} = 50 dB
Belgium W	L_{den} : 65 dB (cities) and 62 dB (outside cities) in front of houses L_{night}: 55 dB (cities) and 52 dB (outside cities) in front of houses
Cyprus	L_{den} = 70 dB, L_{night} = 60 dB
Denmark	L_{den} = 58 dB (consider noise reducing asphalt), 68 dB (consider noise barriers or facade insulation)
Germany	L_{den} = 60 dB, L_{night} = 47 dB
Greece	L_{den} = 70 dB, L_{night} = 60 dB
Ireland	The choice of an 'Action Level' was left to the discretion of the Action Planning Body i.e. the Local Authorities. EPA recommends that proposed onset levels for assessment of noise mitigation measures for noise due to road traffic are as follows: L_{den} = 70 dB and L_{night} = 57 dB
the Netherlands	They took all noise measures from road projects and maintenance program in the years 2008 till 2013 for a start. These measures were used in order to calculate the outcome of these measures in terms of noise levels at housings. Before and after calculations concentrated on the effect on the amount of housings with noise levels above 65 dB L_{den}. Although exceeding national noise limit values were used to get noise measures in our road projects, we did not use exceeding national noise limit values to prioritize the noise measures. We did no prioritizing at all regarding the noise measures.
Norway	$L_{Aeq,24h}$ = 42 dB indoor in existing dwellings. The noise limit value is binding according to Norwegian law.
Poland	The choice of an 'Action Level' was left to the discretion of the Action Planning Body i.e. the Local Authorities. In Poland they use an "M indicator", which takes into account the value of exceedance of noise limit values and the number of people exposed to this noise (see Table 6 on p. 27). To set M indicator in some action plans there was used L_{den} in others L_{night}.

Member state	Limit value
United Kingdom	There are two criteria set out in the Noise Action Plans to determine whether noise mitigation needs to be considered. These are 'Important Areas' and 'First Priority Locations' and are defined as follows: Important Areas: the 1 % of the population* that are affected by the highest noise levels from major roads are located according to the results of the strategic noise mapping. Important Areas with First Priority Locations: Important Areas that have road traffic noise levels in excess of 76 decibels according to the results of the strategic noise mapping. *In the Major Roads (outside agglomerations) Noise Action Plan, the total population is the number of people within the 50 dB $L_{A10,18\,h}$ contour from major roads outside agglomerations according to the 2001 census. In the individual agglomeration Noise Action Plans, the total population is the total number of people living in the agglomeration according to the 2001 census.

The table above is far from a complete overview of the applied noise limits in different countries, used in the noise action plans or as an indicator for when the NRA is considering noise mitigation measures. However, it is found that a range of levels has been used for very different noise limits in Member States from L_{den} 58 dB to 70 dB.

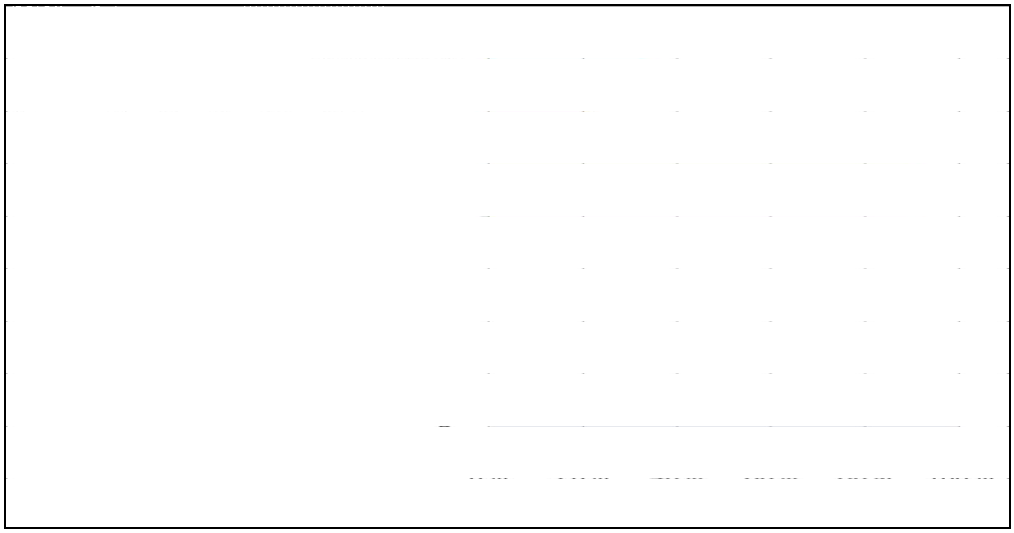

Figure 5 Noise-sensitive areas which noise action plans relate to

All noise action plans relate to the noise impact on dwellings, while approximately 80-90 % state that they also relate to noise impact on hospitals, old people homes etc., institutes of education and child-care institutions. Recreational areas, summer/winter cottages and quiet areas are considered by approximately 20-30 % of the noise action plans.

5.3 Quiet areas

Quiet areas contribute positively to public health. As part of the action plans, Member States were required to introduce specific measures and draw up action plans to protect quiet areas. However, the END left it to the discretion of the Member States to delimit these areas.

END includes the following elements about quiet areas.

- Article 2.1 says that the Directive shall apply to environmental noise to which humans are exposed in particular in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings and areas.
- Article 3 explains the distinction between relatively quiet areas in an agglomeration and relatively quiet areas in the open country. A Quiet Area in an agglomeration is a space in an urban area that is delimited as such by a competent authority and, for example, is not exposed to noise levels above a certain limit. A Quiet Area in open country is an area that is undisturbed by noise from traffic, industry or recreational activities.
- Article 11 requires the European Commission to report no later than 18 July 2009 to the European Parliament and Council on the implementation of the Directive and amongst the various issues the report is asked to propose, if appropriate, implementation strategies for the "protection of quiet areas in the countryside."

The respondents were asked if their respective countries have defined "quiet areas".

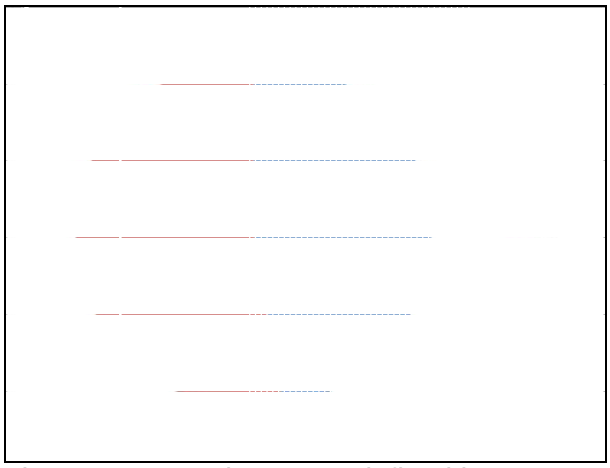

Figure 6 Are "quiet areas" defined in your country?

9 out of 19 countries replied that they have a definition on quiet areas. The respondents were also asked to describe how quiet areas are defined in their respective countries. Against this background it seems that the definitions on quiet areas are generally quite vague.

Table 4 Definitions of quiet areas

Member state	Definition
Belgium F	There is no legislation but there exists a label of quality for quiet areas. These are the acoustical criteria: • L_{A50} during day and evening • $L_{Aeq,night}$ • Assessment of silence by visitors and residents • The percentage of time that strange sound field is observed by a researcher during day and evening • Number of measured strange noise events per 15 minutes • The perception/observation of strange noise by a visitor or resident The method is described in an article: Quality labels for the quiet rural soundscape , INTER-NOISE 2006, Dick Botteldooren and Bert De Coensel
Denmark	In a quiet area in the open countryside there should not be intrusive noise from traffic, industry or recreational activities. As a general rule one can say that there must be at least 3 km distance to the nearest motorway and 1 km to the nearest highway. The EPA recommends that the noise level of quiet areas is based on the guidance values for residential areas which are e.g. 58 dB L_{den} for road traffic noise and sharpens them with 5-10 dB in quiet area. In larger, overall urban areas, a noise limit value of 58 dB is recommended. 58 dB is a noise level that most people won't find that especially low - but the relatively high recommended limit value is set to municipalities not automatically exclude potential quiet areas. EPA envisions that e.g. parks, cemeteries, playground to schools, nurseries, etc. may be designated as quiet areas in cities.
Finland	In populated areas, a quiet area is defined as an area where noise from any noise source does not exceed 50 dB during the day ($L_{Aeq,}$ 07-22) and 45 dB at night (L_{Aeq}, 22-07).
Germany	There are defined three different types of quiet areas, but there are no exact recommended noise limit values: • "Quiet Axis", which is used in the context of urban city planning. The idea is to have routes through a city with calm surroundings. A "quiet axe" implies in most cases, reduced traffic amount and /or low speed limit. • "City oases", such as smaller parks within urban areas, • "Countryside", quiet areas in open land free of disturbance from traffic noise.
Norway	In parks, woods, cemeteries or similar suitable for recreational purposes. In dense populated areas where the noise level is below 50 dB L_{den}. Outside dense populated areas where noise level is below 40 dB L_{den}.

Member state	Definition
United Kingdom	UK's Transport Research Laboratory has recommended that public and open spaces in the UK, should fall within the noise band < 55 dB L_{day} (as determined from the first round of noise mapping) and a minimum area (the candidate area must be at least 9 ha). The specifications for the filter definitions and the candidate list of Quiet Areas should be reviewed and, where necessary, revised by the relevant authorities before the list is finalised. The following filter specifications have been used: • Noise Level filter: The specification of a 55 dB L_{day} limit is seen as an appropriate compromise, based on the mapping requirements of the END and definitions for Quiet Areas used elsewhere in Europe. • Minimum Area filter: The specification of a minimum area of 9 ha is based upon consideration of both the minimum area that should lie within the defined noise limit to warrant preservation (75 %) and the minimum area required to achieve 55 dB L_{day}, based on the presence of at least one major road at the boundary. • Minimum Area 'of Quiet' filter: The specification that a minimum area of 4.5 ha must fall within the noise band < 55 dB L_{day} is to allow areas significantly larger than 9 hectares to qualify as candidate Quiet Areas when less than 75 % of the area falls within the specified noise band.

Most countries have no definition for quiet areas. For those countries where quiet areas are defined, the definition in several instances is either rather vague or imprecise. In addition to this it has not been possible to identify any noise action plan that actively includes consideration of quiet areas in noise action planning.

In order to comply with the intentions in END regarding quiet areas, there seems to be a need for a more precise definition of quiet areas and guidance on the identification and protection of quiet areas and how quiet areas can be included in noise planning.

In a report from the European Union [14] there are a number of recommendations on how to define, identify and preserve urban and rural quiet areas. One of the recommendations is that L_{den} 50 dB should be the upper limit for relatively quiet areas in Urban locations. If a higher 'gold standard' level is to be defined for urban area then it would be sensible to strive for 40 dB L_{den}. The upper noise limit criterion for rural quiet areas should be 40 dB $L_{Aeq,24\,h}$ or its equivalence in L_{den}.

6 Measures, criteria and strategies for noise abatement

In accordance to Article 8, Member States shall ensure that, the competent authorities have drawn up action plans notably to address priorities which may be identified by the exceeding of any relevant limit value or by other criteria.

On that background, we have looked at:

- the types of noise mitigation measures included in noise action plans;
- what are the main criteria for selecting noise reducing measures;
- what goals or specific actions are included in noise action plans;
- specific criteria for the implementation of noise mitigation measures;
- the use of cost-benefit analysis.

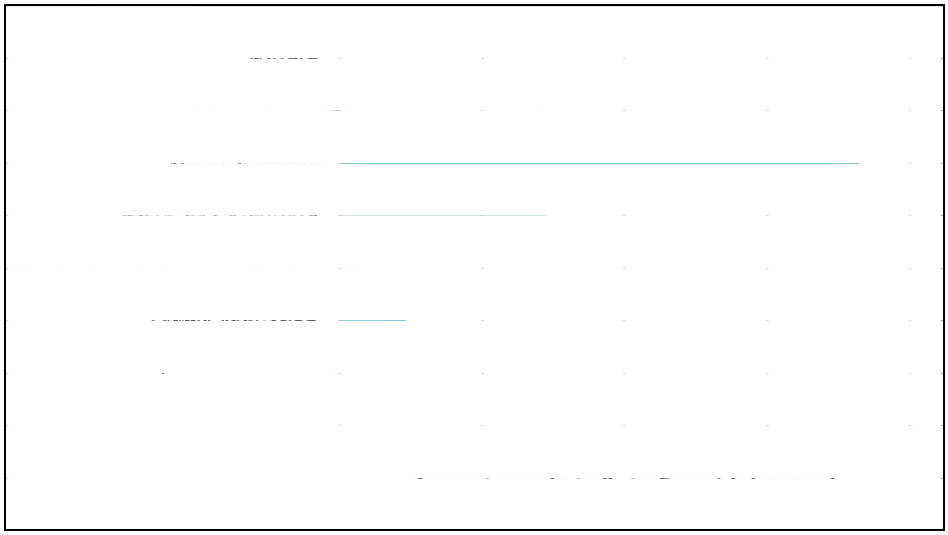

Figure 7 Measures included in noise action planning for the reduction of noise
Note: Each respondent had to specify a number between 1 and 5 for each measure. The figure reflects the average of the answers provided.

As can be seen in Figure 7, noise barriers are widely used, after that it is low-noise road surfaces, land-use planning and façade insulation that are the most common measures for reducing noise. Land-use planning is an example of a measure which is typically used in the rural and urban planning process, which is not covered by the NRA's field of competence, as well as building design and low-noise tyres.

With regard to criteria for applying noise reducing measures Figure 8 shows, not very surprising, that noise exposure a residential areas by far is the most important criteria. Noise at recreational areas is not a criterion for implementation of noise mitigation measures.

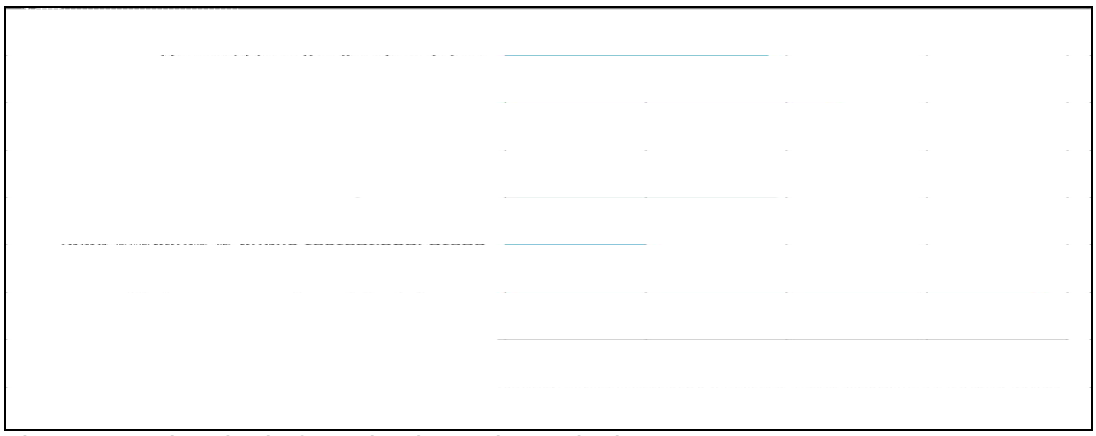

Figure 8 Main criteria for selecting noise reducing measures
Note: Each respondent had to specify a number between 1 and 5 for each measure. The figure reflects the average of the answers provided

6.1 Goals and specific actions included in noise action plans

According to END, Annex V, an action must include information about "actions which the competent authorities intend to take in the next five years". Against this background, the CEDR members were asked if any goals or specific actions are included in the NAP. By extension, the respondents were asked to give examples of goals and actions.

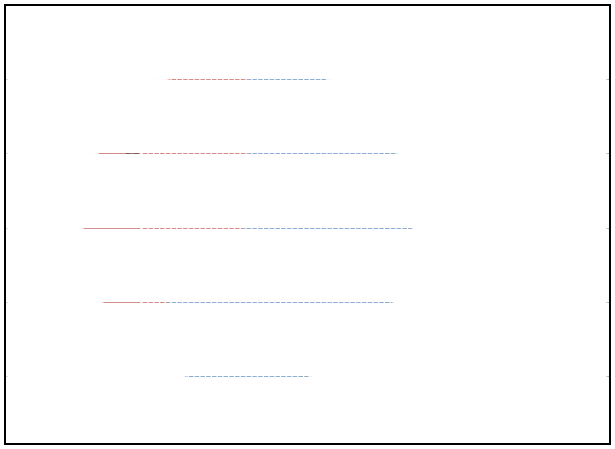

Figure 9 Do the noise action plans along major roads include any goals or specific actions, which the competent authority intend to fulfil, within the period of the noise action plan?

10 out of 16 respondents stated that the NAP contained either objectives or specific actions to reduce noise while still 6 out of 16 do not. It is considered that goals and actions are generally not well described in the action plans; it has been difficult to find good examples of how goals and actions are included the Action Plan.

Table 5 Examples of goals and specific actions from the first round of noise action plans

Member state	Goals and specific actions
Cyprus	The Action Plan contains specific targets for the installation of Noise Barriers along specific sections of major roads where it was found that L_{den}/L_{night} exceeds 70/60 dB in residential areas, within 3 years (2009, 2010, 2011), after further detailed Noise Mapping studies.

Member state	Goals and specific actions
Denmark	There is allocated a total pool of EUR 53 million for an effort to reduce traffic noise along existing infrastructure managed by the state from 2009 until 2014. The funds will be used in the most cost-effective projects based on an evaluation of noise reduction and economy. Based on noise mapping and a set of criteria the NRA will prepare a catalogue of the relevant noise barrier projects as a basis for future prioritization of noise barrier projects.
Poland	Specific actions and measures set in NAP for Świętokrzyskie province are divided in three groups: 1. Short-term actions 2. Long-term actions 3. social education 1) Short-term actions are the main part of the NAP and are related to the period 2009-13. The aim of these actions is to decrease an excess of noise limits in the most affected areas. These areas are inhabited by the most people and have the highest noise level. Short-term actions comprise the following measures: i. Ensuring realization by National Road Authority its investment plans of building bypasses and fragments of roads ii. Erecting noise barriers or soil embankments, especially nearby schools endangered by high noise level iii. Reducing permissible speed limit by the relevant system of information signs and installing speed enforcement cameras in noise exposed areas. iv. Heightening and lengthening of existing noise barriers. 2) The long-term actions with the horizon in 2018 contain measures to achieve the main objective of the NAP, i.e. ensure the noise limit values in all areas surrounding the analyzed sections of national roads. Long-term actions comprise the following measures: i. Completing of investment plans of National Road Authority. ii. Rehabilitation of pavement on existing roads in noise affected areas. iii. Executing an assessment and review of the assumptions and effectiveness of short-term actions. iv. Performing noise reduction measures arising from unforeseen changes of acoustic climate in the analyzed areas. 3) The last section concerns education of the public on the impact of noise and ways to reduce it. Systematic and coordinated social education directed primarily to drivers, benefiting from individual means of transport may bring a measurable effect. Social education include below actions: i. Promotion of public transport, cycling and development of cycle paths network. ii. Promotion and education of alternative forms of car use, i.e. carpooling and eco-driving style. iii. Promotion of "silent" vehicles. Furthermore in section concerning social education authors of NAP also laid the emphasis on importance of proper spatial planning, which takes into account the road noise.

Member state	Goals and specific actions
the Netherlands	For the 2008 action plan for national roads, all noise measures in road projects planned in the period 2008-13 were inventoried (roughly 125 km noise barriers and 140 km silent pavement). With the use of this inventory and the noise map for national roads, the effect of these noise measures was calculated. Realising all the proposed measures in 2013, resulted in an improvement of the noise quality along national roads compared to the situation represented by the END noise map. After realising these planned measures, a reduction of 35 % houses with noise levels of 65 dB L_{den} or more was calculated. It takes some EUR 400 million to realize these measures. In addition to these already planned noise measures, there is a long-term noise remediation program of hot spots along national roads (dwelling with noise levels above 65 dB L_{den}). In 2008 there was a budget of EUR 650 million for noise measures to solve these hot spots along national roads and railways during the period 2011-20. Realisation of this long-term noise remediation program should reduce the amount of houses along national roads with a noise level above 65 dB L_{den} to a negligible quantity. This 2008 snapshot will be reviewed while making the second END action plan in 2012-13. For instance, based on the 2012 END noise map for major roads, the scope of the long-term noise remediation program of hot spots will be recalculated. In the past years the total budget to solve the hot spots along national roads and railways has increased to EUR 871 million, of which EUR 418 million will be spent on hot spots along national roads. The ambition is still the same, reduction of the amount of houses along national roads with a noise level above 65 dB L_{den} to a negligible quantity in 2020.

6.2 Specific priority criteria for the implementation of noise mitigation measures

To examine how the implementation of noise mitigation measures are prioritized, the respondents were asked to specify if there was any specific priority criteria used for the implementation of noise mitigation measures that were included in the NAP. In addition, the respondents were asked to give examples of such priority criteria.

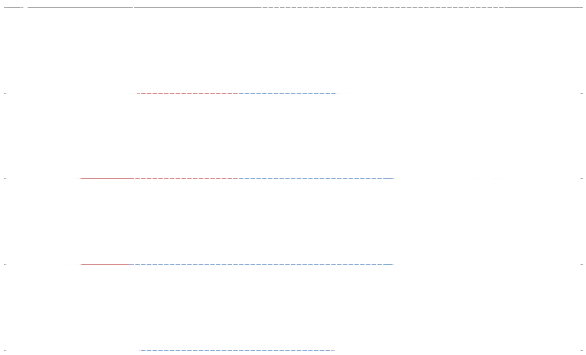

Figure 10 Do the noise action plans list specific priority criteria for the implementation of noise mitigation measures?

11 out of 16 countries stated that they were operating with a set of criteria for the implementation of noise mitigation measures. The following table contains some examples of these criteria.

Table 6 Examples of specific priority criteria in NAPs from different countries

Member state	Priority criteria
Cyprus	1. It is a prerequisite that L_{den}/L_{night} exceeds 70/60 dB and that it is a residential area or a sensitive receiver (school, child care, health institute, house for the elderly or people with special needs) for measures to be considered at this stage. These non-binding noise levels may be revised in the future. 2. Density of population 3. Highest noise levels 4. Type of noise sensitive receiver (school, residential, health care) Where complaints are more persistent.
Denmark	Noise mitigation measures along existing roads will be prioritized as follows: • Residential areas exposed by more than 68 dB L_{den}, where it is most cost-effective[1)] (noise barriers and noise insulation) • Noise reducing asphalt on national roads which pass urban communities exposed to more than 58 dB L_{den} when the asphalt need to be replaced due to the general road maintenance [1)]The Noise Exposure Factor (NEF) is the basis for the cost-effectiveness analyses of noise from road traffic in Denmark. It is an expression of the accumulated noise load on all the dwellings in an area. It is calculated as the sum of the weighted noise loads on the individual dwellings in the area, so that dwellings with high noise levels weight more than dwellings with less noise. The calculation of the NEF is based on noise levels outside the façade of the dwelling. It is calculated as free-field values on the facade and can be interpreted as the noise level to which the inhabitants are exposed, when the windows are open. The NEF is based on a dose-response relation called the annoyance factor and given by: Annoyance factor = $0.01*4.22^{0.1(L_{den}-K)}$, where K=41 and L_{den} starts at 58 dB for noise outside dwellings. Read more in the report; Highway noise abatement, Planning tools and Danish examples, Danish Road Directorate (2009)

<table>
<tr><th>Member state</th><th>Priority criteria</th></tr>
<tr><td>Ireland, Dublin City</td><td>A decision/selection matrix is a chart that enables identification, analysis and rating of the strength of relationships between various sets of information. It enables a number of different factors to be examined and facilitates assessing the relative importance of each. For the actual action plan it is proposed that the higher the number achieved in the decision matrix process, the higher the priority for action. A value of 17 or more is suggested as the point where priority action should be considered either to reduce excessive sound levels or to preserve low sound levels where they exist.
<table>
<tr><th colspan="2">Decision Selection Criteria</th><th>Score Range Day</th><th>Score Range Night</th><th>Sub Total</th></tr>
<tr><td rowspan="7">Noise Band (dB(A))</td><td>< 55</td><td>3</td><td>4</td><td></td></tr>
<tr><td>55-59</td><td>2</td><td>2</td><td></td></tr>
<tr><td>60-64</td><td>1</td><td>3</td><td></td></tr>
<tr><td>65-69</td><td>2</td><td>4</td><td></td></tr>
<tr><td>70-74</td><td>3</td><td>5</td><td></td></tr>
<tr><td>>= 75</td><td>4</td><td>6</td><td></td></tr>
<tr><td rowspan="6">Type of Location</td><td>City Centre</td><td>1</td><td>1</td><td></td></tr>
<tr><td>Commercial</td><td>1</td><td>2</td><td></td></tr>
<tr><td>Residential</td><td>2</td><td>3</td><td></td></tr>
<tr><td>Noise Sensitive Location</td><td>3</td><td>3</td><td></td></tr>
<tr><td>Quiet Area</td><td>3</td><td>3</td><td></td></tr>
<tr><td>Recreational open space</td><td>2</td><td>2</td><td></td></tr>
<tr><td rowspan="3">Type of Noise</td><td>Road</td><td>2</td><td>3</td><td></td></tr>
<tr><td>Rail</td><td>1</td><td>2</td><td></td></tr>
<tr><td>Airport</td><td>3</td><td>4</td><td></td></tr>
</table>
Table shows a decision/selection matrix to identify areas to subject to noise management activities. For example an address, which falls within the Sound level 65-69 dB in the day (2) and 60-64 dB at night (3), in a quiet area for day and night (3+3) and exposed to sound from traffic day and night, (2+3) will give an overall total of 16. </td></tr>
<tr><td>Poland</td><td>The main criteria in Polish NAP which determine the order of implementation of the actions which are to reduce the negative noise impact in the inhabited areas is the "M" indicator. The areas where the "M" indicator has the highest value have the priority. The "M" indicator takes into consideration the excess of the noise over the limit of acceptable noise levels and the number of people inhabiting a particular area. NAP takes into consideration the terrains where "M" indicator is above 0 and specific action to protect them are analyzed.

"M" indicator formula:

$M = 0.1\ m\ (10^{0.1\Delta L} - 1)$

where:

M "M" indicator value
ΔL Noise excess value in dB,
m Number of people exposed to noise over the limits.

Binding legislation define only the formula of "M" indicator, but do not precise the range of priority of it. In most NAP the highest priority have the areas where the "M" indicator is above 50. The areas with "M" indicator value over 50 are most exposed to noise, thus they have top priority in being provided with equivalent noise mitigation measures.</td></tr>
<tr><td>the Netherlands</td><td>The criteria from NL, is to reduce the amount of houses along national roads with a noise level above 65 dB L_{den} (please see Table 5)</td></tr>
</table>

Member state	Priority criteria
Spain	For the definition of the areas established for barrier installations, the following criteria have been considered: • Exposure levels. Areas in which the Lnight exposure values are below 55 dB(A) have been excluded. • Affected population. Generally, the exposed areas with a minimum of 300 affected people have been included in the proposals. However, a considerable number of areas with less population have been included, due to the singularity of the area, the presence of schools or hospitals or the characteristics of the city centre. • Technical viability: the real possibility of barrier construction is evaluated, having rejected the proposal when there is not enough space or when the receptor is much higher than the road. In the areas determined for the establishment of priority actions, the A and B categories have been defined based on the severity of the impact and the effectiveness of the action. For action proposals, only the residential buildings, educational buildings and hospitals have been considered.
United Kingdom	There are two criteria set out in the Noise Action Plans to determine whether noise mitigation needs to be considered. These are 'Important Areas' and 'First Priority Locations' and are defined as follows: *Important Areas:* the 1 % of the population* that are affected by the highest noise levels from major roads are located according to the results of the strategic noise mapping. *Important Areas with First Priority Locations*: Important Areas that have road traffic noise levels in excess of 76 dB L_{den} according to the results of the strategic noise mapping. *In the Major Roads (outside agglomerations) Noise Action Plan, the total population is the number of people within the 50 dB LA10,18 h contour from major roads outside agglomerations according to the 2001 census. In the individual agglomeration Noise Action Plans, the total population is the total number of people living in the agglomeration according to the 2001 census.

6.3 Financial issues

According to Annex V of END, an action plan must include financial information (if available) about budgets, cost-effectiveness assessments and cost-benefit assessments. Cost-benefit analysis is a form of economic analysis that compares the relative costs and outcomes (effects) of two or more courses of action. Cost-effectiveness analysis is distinct from cost-benefit analysis, which assigns a monetary value to the measure of the effect.

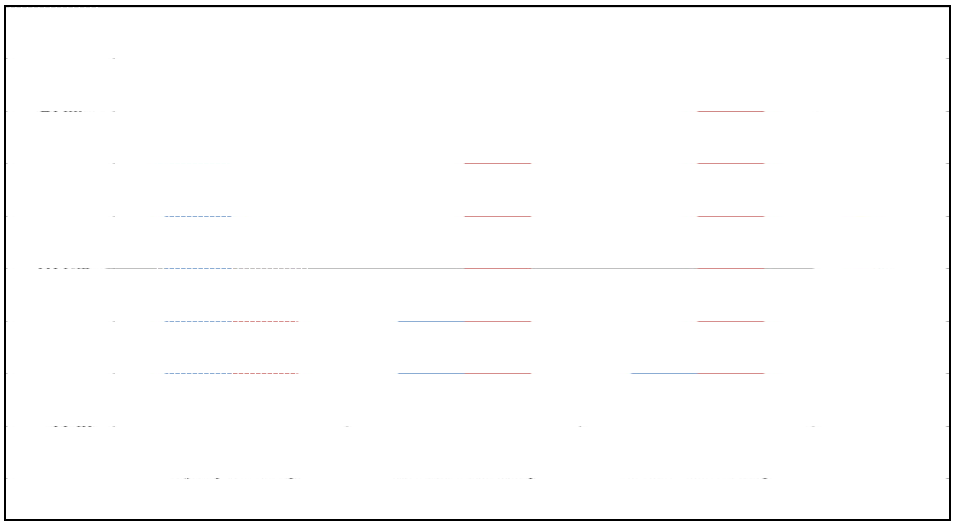

Figure 11 Percentage of noise action plans with financial information

Approximately 60 % of the Member States specified that there is a budget for noise abatement while the remaining 40 % have no budget at all. In countries where cost-benefit analysis have been used, it seems that the analysis are used exclusively at a local level, e.g. for prioritization or optimization of selected projects. No country reported having used cost-benefit analysis on a large scale. This is exemplified by the following comments.

- The cost-effectiveness assessment was carried out only to see what the most cost-effective height is for noise barriers to be installed along all the residential major roads where L_{den}/L_{night} exceeds 70/60 dB and it is physically possible to install barriers. It was also carried out to estimate what the reduction of the percentage of the exposed population would be. Cost-benefit assessment was not carried out in the sense of setting a cost limit per resident per dB reduction (Cyprus).
- In the noise action plan there is a rough estimation of the total costs for noise measures on a national level. On local, project level, cost-effectiveness assessment is used, but it is not a part of the END (Netherlands).
- The Noise Action Plans require highway authorities to consider the feasibility of implementing noise mitigation measures at Important Areas/Important Areas with First Priority Locations adjacent to roads in the context of Government policy on sustainable development. Therefore, this requires highway authorities to look beyond cost-effectiveness of noise mitigation measures and hence does not request cost-effectiveness or cost-benefit assessments (UK).

Member states were also asked to outline the main problems encountered in the preparation of noise action plans. One of the main problems encountered was the absence of suitable methods for cost-benefit analysis, and lack of budgets for noise abatement (see section 8).

In December 2003 a European Commission working group - 'Working Group on Health and Socio-Economic Valuation of Noise' - produced a position paper [16]. In this paper the following was recommended.

- For road transport, the (interim) use of the median value change in noise perceived by households of EUR 25 per dB L_{den}, per household per year. The validity range of this interim value is between 50/55 L_{den} and 70/75 L_{den} and it should be adjusted as new research on the value of noise becomes available.
- The estimate of the change should apply at all initial noise levels, and regardless of the size of any change brought about.
- In the absence at present of conclusive evidence on how the value might vary on different modes, it is advised to leave open the possibility of an adaptation of this roads-based value for use on other noise sources such as rail and air using adjustment factors. Specific research should be carried out to resolve this issue.
- This value should be corrected using PPP (Purchasing Power Parity) indices for use in accession candidate countries if necessary.
- For other impacts, it is recommended that, in the interim, qualitative and quantitative assessments are used to complement the value of the perceived changes and that research is initiated on this issue.

According to the European Commission funded SMILE project *"In other German regions, where the housing market is more stable, it was found (Borjans et al.) that noise could reduce the value of a plot of land by at least 1.5 % for every decibel exceeding 50 dB(A) during the day. Even at times when the demand for individual dwellings was extraordinarily high, a plot of land with an average sound level of 70 dB(A) was found to cost 30 % less than a plot with an average sound level of 50 dB(A)." [15]*

The Danish Environmental Agency has carried out a hedonic pricing study for Denmark. The study looked at single-family dwellings with noise levels above 55 dB. Statistical analysis was applied to derive the following findings about the decrease in real estate prices:

- 1.64 % per dB was found for dwellings next to motorways,
- 1.18 % per dB was found for dwellings next to other roads,
- 1.20 % per dB as an average for all roads.

The average percentage corresponds to a reduction in the average house price of approximately EUR 1700 per dB with the average real estate prices in 2000. With a discount rate of 6 % this value can be translated into a reduction in the yearly house rent of DKK 780, about EUR 105 per dB. [17]

7 Consulting the public

Involving the public in the preparation of noise action plans is one of the fundamental requirements of the END. Article 8 paragraph 7 of the Directive stipulates the following basic conditions for public involvement:

Member States shall ensure that the public:
- is consulted about proposals for action plans;
- is given early and effective opportunities to participate in the preparation and review of the action plans;
- that the results of that participation are taken into account;
- that the public is informed on the decisions taken;
- reasonable time-frames shall be provided allowing sufficient time for each stage of public participation.

On this background it has been examined:
- how the public was consulted,
- consultation period and responses from the public,
- experiences from consulting the public,
- the impact on noise action plans.

7.1 Means of consultation

As can be seen in Figure 12 the most commonly used mechanisms for public consultation was internet/websites and advertisements in newspapers. 80 % of the respondents stated that advertisement in news papers etc. were used to consult the public, while 100 % stated that the internet was used.

It should be noted 30 % responded public meetings were used as a part of the hearing which enables immediate communication between officials/consultants and citizens members who are impacted by the contents of the action plan.

Other means of communication were used, as shown in the following examples.

- Ireland used local TV programmes and an e-mail link was provided for comments.
- In the Netherlands, all regional departments of the Dutch Rijkswaterstaat had a copy of the action plan available for public consultation.
- In Estonia, hard copies of the document were available in local municipalities, as well as in road authorities and on its website.
- In Denmark, the National Roads Authority addressed a letter to all local authorities with a hard copy of the Noise Action Plan.
- In Norway, one out of five regions had a public consultation of their action plan. Their action plan was discussed in a local forum for noise and air pollution. The forum consists of representatives for the municipality, the county administration, different agencies for environment, health and transport and the road administration.

In all Member States, public consultations have been conducted after the release of the draft action plan.

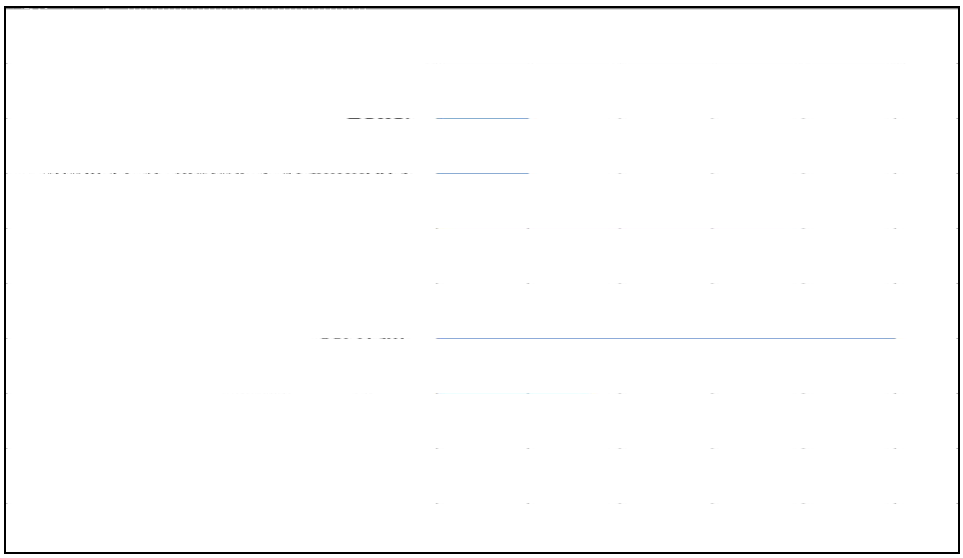

Figure 12 Methods used to consult the public about noise action plan proposal

7.2 Consultation period, responses and involvement of the public

The consultation time period on the action plans varied from 14 days in Estonia to 150 days in Sweden. Most of the Member States had a consultation period between 1 and 2 month.

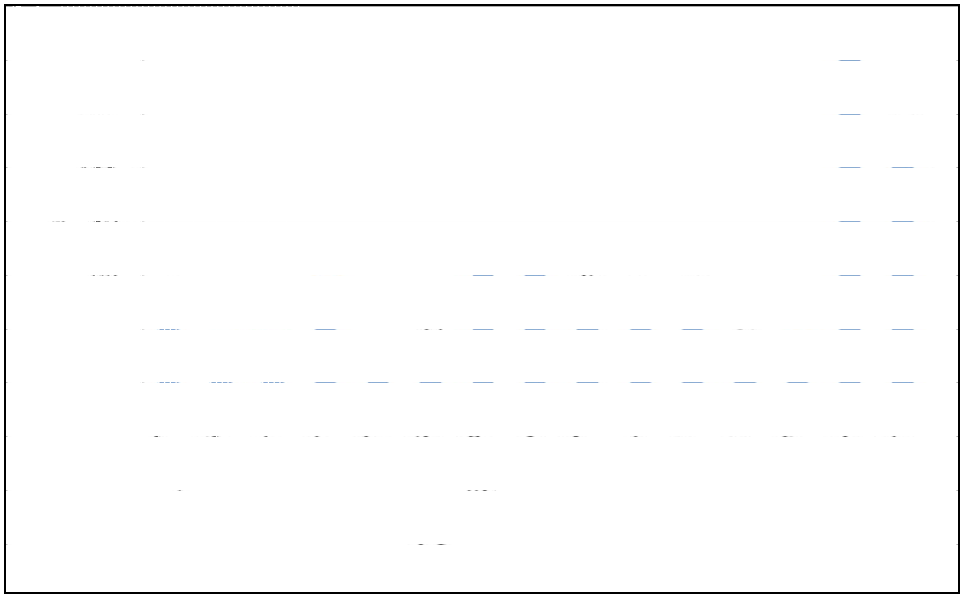

Figure 13 Length of the consultation period

Note: Some NRAs have no overall response to this question, e.g. Germany where the municipalities are responsible for the action plans along all major roads within their territory.

In a Communication from the Commission "Towards a reinforced culture of consultation and dialogue - General principles and minimum standards for consultation of interested parties by the Commission" [18] the Commission lays down a number of general principles that should govern its relations with interested parties, and a set of minimum standards for the Commission's consultation processes. It is stated that the Commission should strive to allow at least 8 weeks for reception of responses to written public consultations.

Based on the above the CEDR Project Group Road Noise find it suitable to allow a consultation period of at least 8 weeks to ensure a reasonable time-frame for the public participation about proposals for noise action plans.

The numbers of responses from the public consultation about proposals for noise action plans in each Member State varied from 0 to 154 responses (see figure below).

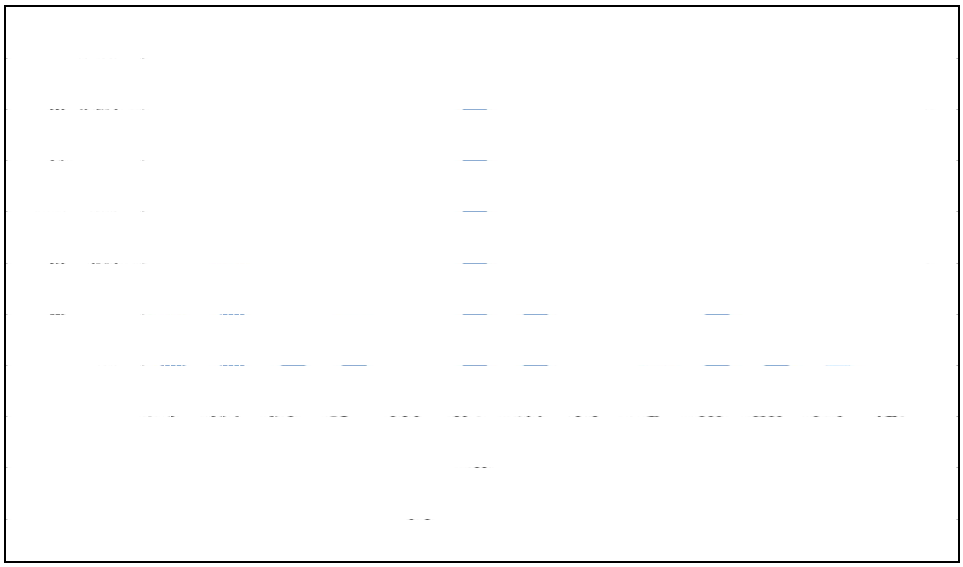

Figure 14 Number of responses from the public consultation
Note: Some NRAs have no overall response to this question, e.g. Germany where the municipalities are responsible for the action plans along all major roads within their territory.

All in all, the number of responses to the proposal for noise action plans must be regarded as very low, indicating a poor public involvement. The project group has not made any further analysis of the reasons for the limited public involvement, but one reason could be poor communication and dissemination of information on noise action plans to the public. As indicated in Figure 15 (below) the respondents in the survey do not agree with the statement: "The public have been given early and effective opportunities to participate in the preparation of the noise action plan".

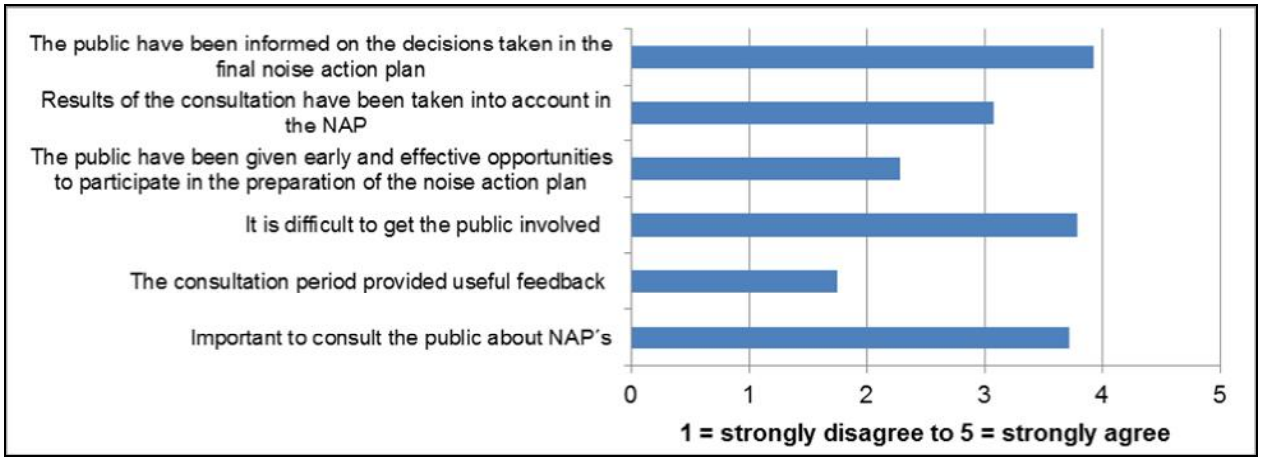

Figure 15 To what extent do you agree with the following statements about the results of the hearing
Note: Each respondent had to specify a number between 1 and 5. The figure reflects the average of the answers provided

Results presented in Figure 15 imply that the respondents believe in the importance of consulting the public about Noise Action Plans, but that it is difficult to get the public involved in the hearing process and that the consultation of the public gave no useful feedback. However, the respondents agreed on that it is important to consult the public about proposals for noise action plans.

The respondents were asked for suggestions on how to get the best possible engagement from the public in the development and implementation of noise action plans. The following recommendations were suggested and they are outlined below.

- *"It is important to have a clear and comprehensive policy and criteria for the action plans, which will be expressed in a manner understandable to the public." (Cyprus)*
- *"It is very important to have the public informed at the very early stage." (Cyprus)*
- *"If the publication of Noise Action Plan is regulated poorly in national legislation or does not exist, the regulations for consultations with public from Environmental Impact Assessment procedures can be taken over. Those are set in directive 85/337/EEC and most probably specified on national level." (Estonia)*
- *"Noise is a very difficult topic to discuss with the ordinary citizen. It is a very technical subject which few understand, and people are generally most interested in the noise situation at their own homes. Public involvement should especially focus on local authorities, where the interaction between noise from local roads and national roads can contribute to specific noise issues and options for solutions (e.g. cooperation between authorities on solving problems). Local authorities can defend their own citizens' interests and local authorities will often have a good technical knowledge about the noise, allowing good input to the noise action plan." (Denmark)*
- *"The authorities produce numerous plans, programs and designs; some of them are seriously intended, others just to implement some statutes or obligations. Especially in urban areas, it is often difficult for people to find out what the hearing or interactive process is about, or what follows from it. For a given area, the authorities need to coordinate their hearings and actions effectively." (Finland)*
- *"Engagement of the public in strategic thinking and planning is a major educational task and usually will not fit within the time frame of many projects." (Ireland)*
- *"There is a big gap between the reports we normally write and the reports suitable for public consultation. To get them more and better involved, do not use large, technical reports." (Netherlands)*
- *"It must be operative and clear what the noise action plan will mean for the public." (Sweden)*
- *"The public will probably feel involved with plans at a local scale. At a National scale, informing the public is considered enough." (Spain)*

7.3 Some lessons learnt from the public hearing

The respondents were asked about their experiences and lessons learned during the public consultation process. The majority of respondents have problematized the process and highlighted that the process does not make any difference. Many of the respondents found no useful feedback from the process while others faced difficulties with the (local vs. strategic) level of engagement, i.e., on the one hand the public is highlighting problems and looking for solutions at a local level, while on the other hand the officials are mainly focused on describing and analysing issues at a strategic level.

The following is a summary of the comments received from some of the Member States.

- *"The hearing didn't bring any new findings or conclusions." (Austria)*
- *"The people only had questions about their own noise problem where they live (they don't give attention to the global measures in the action plan)." (Belgium F)*
- *"It is rather difficult to get the public involved. If they get involved, they are very collaborative and constructive. People who have lived for long time in noise situation tend not to be active on the issue while new-comers are very demanding in looking for a solution to noise issues. Sometimes it is difficult to find the golden mean. To handle those situations smoothly and most righteous way, very good and well-grounded methods (cost-benefit etc) and regulations must be established." (Estonia)*
- *"The noise barrier nearby my house is the most important!" (Finland)*
- *"People do not think strategically – they think locally and are more concerned about their own welfare than that of the overall community." (Ireland)*
- *"Public consultation should not be undertaken everywhere, but applied to areas where noise levels are a problem and where people are very sensitive to environmental noise effects." (Italy)*
- *"New proposals during public hearings were not received. Inhabitants are interested in obtaining noise reduction measures as quickly as possible. At present these measures are lacking financial backing." (Latvia)*
- *"Positive: None. Negative: The public are only interested in the developments in their own "backyard". Our action plan did not provide solutions for everyone." (Netherlands)*
- *"Establishing a maximum time for public consultations should be considered. Each country should decide on the length of consultation by themselves, but the consultations should take no longer than 30 days. Public consultations lasting longer than 30 days do not bring any significant conclusions, but unnecessarily prolong the start of implementation measures outlined in the NAPs." (Poland)*
- *"No significant results. The hearing is more appropriate for local plans, than for a strategic plan (covering the whole country)." (Spain)*
- *"No lesson learned." (Sweden)*
- *"Not applicable, as Highways Agency did not carry out the public consultation process." (United Kingdom)*

8 General Experiences from the first round of noise action planning

This section refers to good and not so good experiences and recommendations to progress/continue work on second round noise action planning.

8.1 The importance of the Noise Action Plans

Noise Action Plans are designed to be a planning tool and its purpose is to reduce noise where necessary. Therefore Member States were asked if the noise action plans have led to greater focus on noise problems (Figure 16) and the status of NAP (Figure 17).

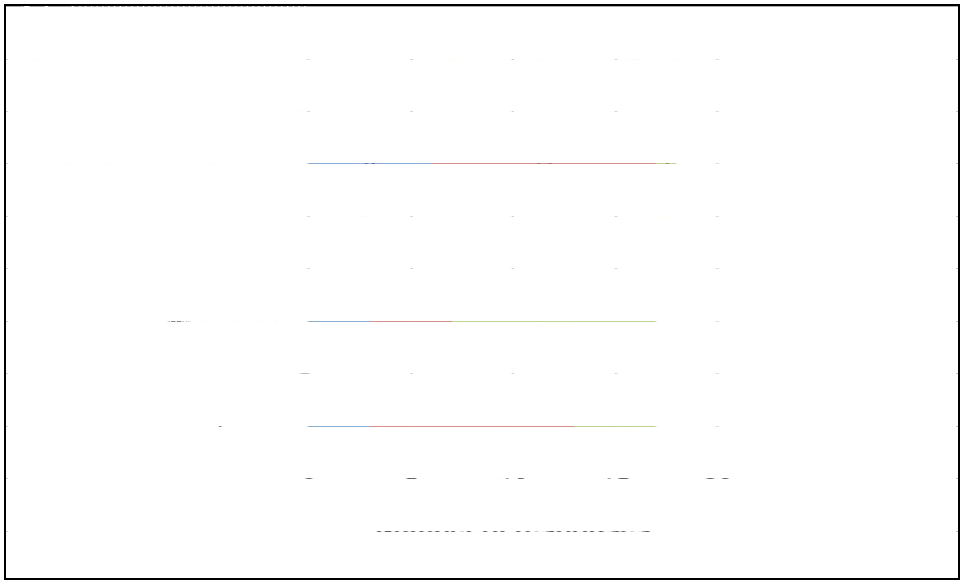

Figure 16 Do you feel that the noise action plans have led to greater focus on noise problems from different stakeholders?

From the above responses, it appears that the noise action plans have led to a greater focus on noise problems. The following comments from different respondents from the survey illustrate these findings.

- *"Particularly at the local level, the work with noise action plans has led to greater focus on road noise. In my country there have been carried out at small study on how the municipalities think on noise action plans. Those municipalities which have carried out noise action plans are positive and consider them as a tool to boost efforts against road noise. Noise Action Plan brings together local knowledge about noise and contributes to collaboration across the municipality for the benefit of the effort against noise." (Denmark)*
- *"The Authority for Budget Approval (Ministry of Finance, MOF) was negative to any proposals for the installation of noise barriers before the 1st round of Noise Mapping. When specific proposals based on Noise Maps and criteria, combined with forecast strategic cost estimates were presented to the MOF, the MOF approved a 3 year budget allocation (subject to annual approval) for Noise Mitigation measures." (Cyprus)*
- *"In relation to my own organisation (National Road Authority, red.), there is a particular focus on the noise action planning process as this will inform future noise management policy across the Strategic Road Network. This means that the 'operational' teams in the Agency are becoming more aware of the noise problems identified as a result of the action planning*

process, and have an important role to play in identifying and implementing suitable noise mitigation measures (subject to funding) to address these problems." (UK)

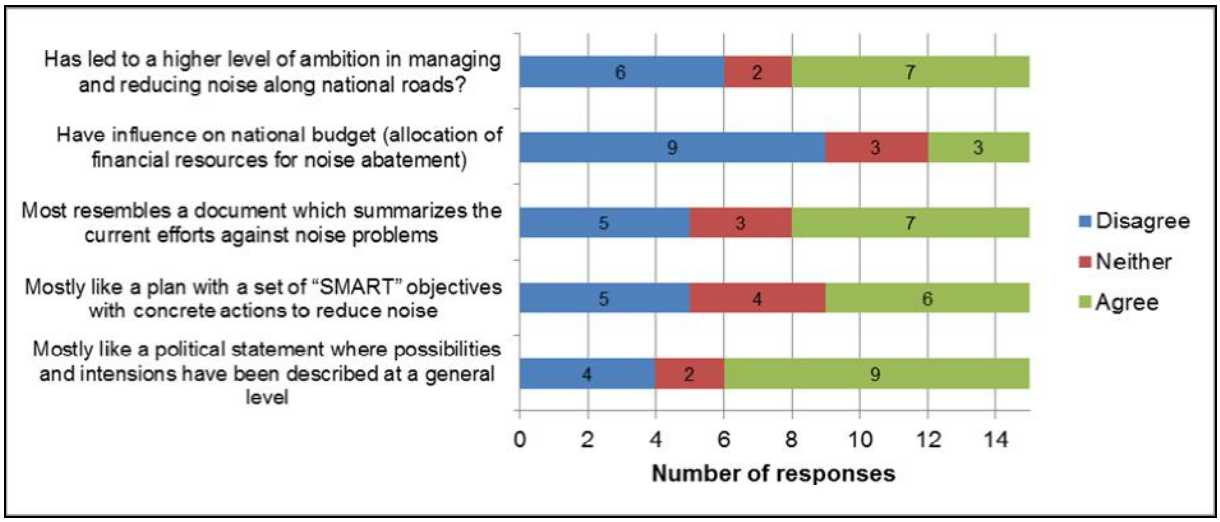

Figure 17 To what extent do you agree with the following statements about the status of the noise action plan along major roads?

There appears to be consensus on the following:

- noise action plans appear to lack influence on national budget with regard to the allocation of financial resources;
- noise action plans are a policy statement where possibilities and intensions have been described on a general level.

8.2 Main problems encountered in drawing up the action plan

Based on their own experiences with the preparation of noise action plans, the respondents were asked to consider a number of statements about possible challenges (see Figure 18).

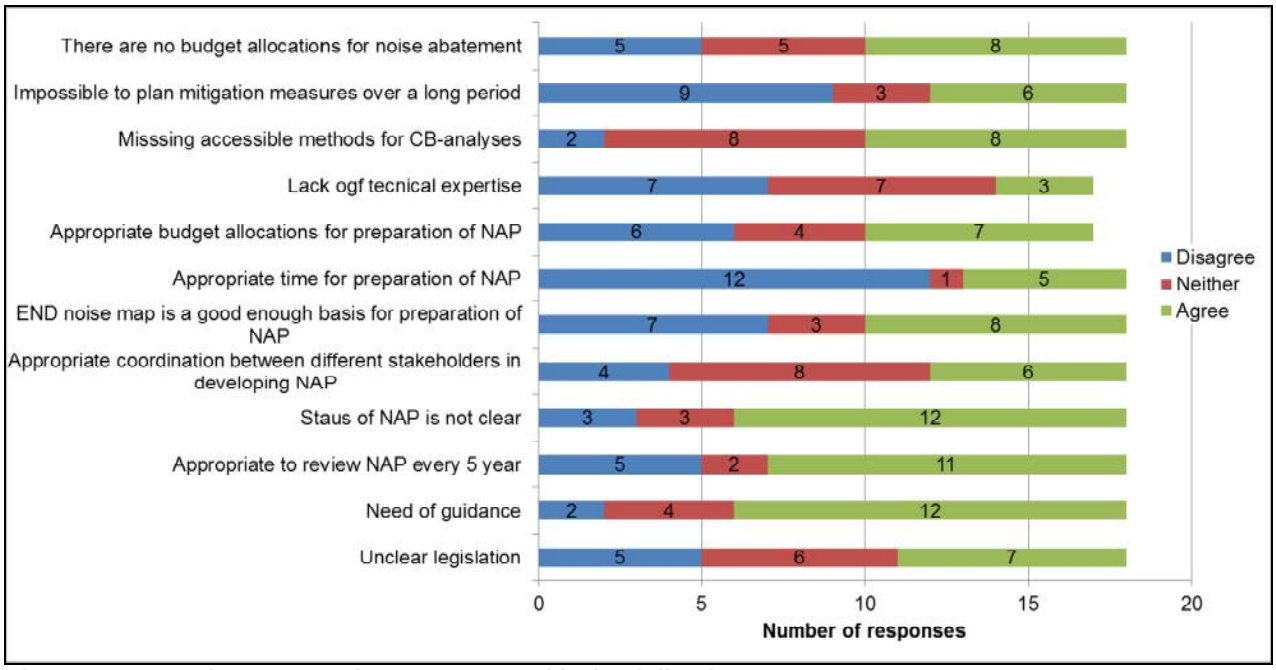

Figure 18 To what extent do you agree with the following statements?

Based on these findings we conclude that there is reasonable consensus on the following:
- accessible methods are missing for cost-benefit analysis (only one country disagrees on that);
- the time for preparation of noise action plan (NAP) is not appropriate;
- the status of NAP is not clear;
- it is appropriate to review NAP every five years;
- there is a need for guidance on the preparation of noise action plans.

In addition to the questions in Figure 18, Member States were asked to state the main problem(s) encountered in the preparation of noise action plans and to suggest possible mechanisms on how these problems can be overcome or minimised for the second round of noise action planning.

In the following there is a presentation and discussion of problems and constraints encountered. An analysis has been undertaken on the comments received, and on this basis, the problems are summarized and collated as follows:
status of the noise action plan is not clear;
lack of budgets for noise control;
deadline for the preparation of noise action plan is too short;
responsibilities and process;
need of guidance.

Re 1. Status of the noise action plan is not clear
Many respondents expressed the opinion that the status of the action plan is not clear enough. For instance they are uncertain about how the NAP interrelates to other overall planning and legislation and whether the plan is part of an overall strategy or a specific plan for reducing noise. Below are some examples of comments received:

- *"The status of the noise action plan is not clear (whether it is a policy paper or a plan with concrete actions)." (Poland)*
- *"The action plans are having no legal status." (Germany)*
- *"The Noise action plan is not operative – it is more a strategy" (Sweden)*
- *"Insufficient clearness of action plan objectives. Should action plan be strategic or a planning document?" (Italy)*
- *"Action plans do not have formal grounding in management" (Norway)*

In some countries the planning and realization of noise mitigation measures along major roads is a part of another planning or legislative process. In the Netherlands for example, new legislation for noise will be implemented in 2012 (SWUNG). A part of this legislation is a yearly report on the noise situation. When a noise level exceeds the noise limit, the authorities are obliged to state which measures they will take to decrease the noise levels and when the measures will be realized. The END Noise Action Plan is just a small part of this legislation and in the light of the new legislation END Noise Action Plan will "probably be nothing more than that yearly report with another cover".

Some Member States are calling for clearer or more specific obligations towards Member States in END with respect to the content of the Action Plan, as one Member State pointed out "it's just a requirement for a plan, and very little about the contents." It is argued that lack of binding noise limit values (either at European level or national level) and lack of obligation to implement actions in the plan, dilutes the status of noise action plans.

Others believe that the action plan should be designed as an overall strategy that lays down some principles for noise considerations and noise abatement; "Formulating two different types of plans: a national or strategic plan and the local action plans" and "Do a common policy paper and action plan for all roads and then extract those measures that are along major roads" and "the Government can support the work of noise action plans by providing some interim or long-term goal of reducing the noise."

Should the noise action plan be a "SMART" management tool, or rather an overall strategy that generally describes where and how the noise problems can be reduced? It would be best if a noise action plan is defined in terms of "SMART" objectives (Specific, Measurable, Achievable, Realistic, Time related) e.g. that the noise action plan include a description of activities to reduce noise within a timetable for implementation of noise mitigation measures. However, this seems to be rather unrealistic in practice, especially due to lack of budget allocation, and the fact that the budget for the next 5 years (the duration of the noise action plan) often is unknown. In this context, it is important to determine the level of ambition of the noise action plan, and what is possible and realistic within a given framework.

Re 2. Lack of budgets for noise control

In general, there is a challenge to be faced due to the lack of budgets for noise abatement. It is difficult to plan for noise mitigation measures, without any funding, and to be specific and action oriented. Many countries are affected by the economic crises, which also affect budget allocation.

The contents of the action plans are spread over a five year period, but potential funding for noise control normally runs typically over a shorter period. It's difficult to allocate funding without formal noise goals or binding noise limit values.

If it is not possible to be specific on what actions can be taken over a 5 year period, because it is unknown whether there will be allocated money for noise mitigation works. One can only describe the efforts to combat noise in case that there is allocated funds.

In the UK, budgets cannot be set or guaranteed for noise mitigation works for any highway authority, particularly over the 5 year life-cycle of a noise action plan. Therefore, the noise action plans in the UK have focused more on the process for investigation of mitigation measures, rather than their implementation.

Re 3. Deadline for the preparation of a noise action plan is too short

One of the main problems in the preparation of a noise action plan is that the time limit for completion of noise action plan is too short. Many countries state that they have been struggling to meet the deadline for finishing the noise action plan, especially when the completion dates is one year after completing the noise mapping programme.

Many countries have been delayed in the implementation of noise mapping, which has given very little time for the preparation of noise action plans. In addition, several Member States highlighted that there is very little time to analyze noise mapping data in terms of identification of problems, and to undertake sufficient public consultation, etc.

Basically, one year to prepare a noise action plan is not sufficient, especially for the NRAs that manage many kilometres of highway and other major roads, which all must be analyzed for noise issues, relevant stakeholders, etc. The second round of noise action plans will include roads down to 3 million vehicles per year, which can easily lead to four times as many kilometres of road as included in the first round of END.

Some Member States have indicated that they have learnt from the first round and they will attempt to start work on action planning at an earlier stage. It is possible to do some of the work even before the noise mapping is completed, and it appears that it is necessary to complete the noise mapping ahead of schedule. It is important to have enough time and resources for the preparation of NAP. Therefore, it is important to draw up a timetable at an early stage in the process, including ensuring that the work has the necessary acceptance and appropriate resources from the management of the organization.

Re 4. Responsibilities and process

Setting up a noise action plan is a complex process which involves many stakeholders e.g., other administrations and authorities, the public etc. In the comments on the challenges of implementing a noise action plan, it is pointed out that cooperation with local authorities, other administrations and authorities was not sufficient and that there has been insufficient focus on the process of creating the plan.

Re 5. General need for guidelines

There is overall acceptance that there is a need for guidelines – especially guidelines or available methods for cost-benefit analysis. It would be very useful to be able to use cost-benefit analysis when assessing and comparing the impacts of different noise mitigation measures.

As one CEDR-member says: "We truly hope that there will be strong cost-benefit method and criteria for planning mitigation measures for the second round of noise action planning in national level. Any help or good examples from other member countries, European Commission or CEDR organisation is more than helpful".

A small number of Member States highlighted that there is a lack of experience with regard to the preparation of noise action plans (this may also apply to noise mapping). Problems in connection with the lack of experience in these countries include both consultants and officials.

9 Conclusions and recommendations

The following presents what we consider as the main findings of the survey, and describes the main problems and challenges with regard to the preparation of noise action plans. In addition, there are in short indicated some recommendations for further work on noise action plans.

Status of noise action plan is not clear
The majority of respondents stated that the status of the noise action plan is not clear. For instance it is not clear what category of document a noise action plan is, and how it interacts with other plans. It appears that an action plan describes the noise situation but it is clear that it has no binding obligations. Most countries indicate that the noise action plan is similar in nature to a policy statement where objectives have been described on a general level. Some Member States are calling for clearer or more specific obligations towards Member States in END with respect to the content of the Action Plan. It is argued that lack of binding noise limit values (either at European level or national level) and lack of obligation to implement actions in the plan, dilutes the status of noise action plans. Currently it appears that END (or the national legislation) is lacking a clear enforcement regime e.g. where noise action plans are linked to the overall aspects of planning procedures e.g. within environmental planning and planning in rural and urban areas.

Recommendation
National legislation should clarify the enforcement regime of action plans and to link noise action plans to the overall aspects of planning procedures e.g. within environmental planning and planning in rural and urban areas.

Need for guidance
There seems to be a strong need for guidance to support the preparation of noise action plans. It varies how the Directive is implemented in member countries, and it is possible to interpret the requirements of the Directive differently. Therefore, it is relevant to consider whether to establish associated guidance, at national level, in relation to the regulation that implements the Directive. Today, only a few countries have published guidance for the preparation of noise action plans. Furthermore a minority of the countries state that there is a lack of expertise on a national level, among both advisors and officials in regard to the implementation and preparation of noise action plans (which probably also applies to the noise mapping).

Recommendation
The END should make it mandatory for Member States to draw up guidelines for implementation of noise action plans at national level.

On a national level, where there is a need, expertise should be developed among both advisors and officials in regard to the implementation and preparation of noise action plans. A remedial measure to this problem could be organization of workshops and establishing ERFA-groups at national level or cross-borders.

Cost-benefit/cost-effectiveness analysis are not used
Cost-benefit analysis is important as it prioritizes the various noise reduction measures and illustrates the socio-economic benefits of noise reducing measures. The study shows that cost-benefit assessments in noise action plans are almost nonexistent, and that there is a general need to implement cost-benefit analysis in the preparation of the action plan. There is a need across the board for developing useful methods to carry out cost-benefit analysis. The application of cost-benefit analysis tools and evaluation of potential mitigation measures also need to be developed.

Recommendation
The EC should provide a common European tool for comparative assessment of cost-effectiveness and of a cost-benefit analysis of different approaches to noise reduction, and in addition the END could include obligations for Member States to assess noise costs and take them into account in their noise action plans.

Targets to be achieved in action plans are not well described
Noise action plans are one of the main planning tools to improve the noise environment in Europe, if the actions identified in the plans are enshrined into some legally binding objectives. According to END an action plan should describe "actions which the competent authorities intend to take in the next five years", although there is no obligation to act. Broadly, it seems that goals and actions for reducing noise are generally not well described in the action plans; it has been difficult to find good examples of how goals and actions are included. One of the main challenges in relation to describing the goals and actions is the fact that either they are not earmarked for funding under a noise abatement scheme, or the budget for the next five years is unknown.

Recommendation
National legislation or strategies should be clear on their national goals to be achieved in noise action plans.

Noise action plans should include goals which are Specific Measurable Attainable Reportable Timely (SMART). Often it is not possible to set specific goals for noise reduction e.g. due to lack of funds. Focus instead on less costly actions, e.g. by setting targets for investigations of mitigation measures, rather than their implementation.

Wide range of methods to prioritize noise mitigation measures
Generally, there are very limited funds for noise control, and therefore it is important that funds are prioritized and used in the best possible way. Within Member States, there are a wide variety of methods to prioritize funds for noise control. More than 2/3 of the countries have stated that they are operating with a set of criteria for prioritization and implementation of noise mitigation measures. The methods seem to be more or less well described. Still there are a number of countries where there are no methods for prioritizing noise control. There seems to be basis and need for a best practice guide on how to prioritize funds for noise control.

Recommendation
The EC should provide a best practice guide on how to prioritize funds for noise control, which probably could be based on already existing methods.

Quiet areas are not considered
Quiet areas contribute positively to public health. As part of the action plans, Member States are required to introduce specific measures and draw up action plans to protect quiet areas. Despise this, the majority of countries have no defined description of quiet areas and for those countries where quiet areas are defined, the definition is often rather vague or imprecise. Furthermore, this survey has not been able to identify any noise action plan that actively includes consideration of quiet areas in noise action planning. In order to comply with the intentions specified in END regarding quiet areas, there seems to be a need for a more precise definition of quiet areas and guidelines for how quiet areas can be included in noise planning.

Recommendation
The END should contain a more precise definition of quiet areas and guidelines for how quiet areas can be included in noise planning.

Consulting the public
Involving the public in the preparation of noise action plans is one of the fundamental requirements of the END. All countries have carried out public consultations on the proposal for noise action plans, but we conclude that the participation of the public has been very weak. The majority of respondents have problematized the process and highlighted that involving the public does not make any difference. Many of the respondents found it difficult to involve the public, and did not experience any useful feedback from the consultation. On the one hand the public is highlighting problems and looking for solutions at a local level, while on the other hand the noise action plans are mainly focused on describing and analysing issues at a strategic level. All in all, the number of responses to the proposal for noise action plans must be regarded as very low, indicating a poor public involvement. The project group has not made any further analysis of the reasons for the limited public involvement, but one reason could be poor communication and dissemination of information on noise action plans to the public.

Recommendation
Allow a consultation period of at least 8 weeks to ensure a reasonable time-frame for the public participation about proposals for noise action plans.

Have a greater focus on how the public should be involved in the preparation of noise action plans. Have a special focus on the consultation of local authorities and interest groups. Local authorities and interest groups can objectively reflect community interests with regard to noise problems, and will often have a good technical knowledge about noise issues, allowing good input to the noise action plan.

Short timeline between strategic noise mapping and finalization of actions plans
The limited timeline between completion of the strategic noise maps and finalization of actions plans seems to be a great challenge and one of the main obstacles to undertaking an appropriate public consultation. Many countries experienced delays in completing the noise mapping, therefore they had very little time for preparing noise action plans. In addition, several respondents have stated that there is too little time to analyze the results of the noise mapping, which is the basis for the preparation of noise action plan, and to ensure a sufficient public consultation, etc.

The second round of noise action plans will include many more kilometres of roads compared to the first round of END. This will lead to an increased time required for preparing action plans. Some countries indicate that they have learnt from the first round, and will try to start earlier to prepare the action plan. It is possible to start some of the work before the noise mapping programme is complete. It is important to have adequate time and resources for the preparation of noise action plans.

Recommendation
Draw up an appropriate timetable at an early stage in the noise action plan process, and ensure that management makes the necessary resources available to undertake the process. Start the work on action planning even before the noise mapping programme is complete and/or complete the noise mapping ahead of schedule.

Lack of budgets for noise control
A general challenge experienced by most Member States was the lack of resources available for noise abatement. Many countries were affected by the economic crises, which also impacted budget allocation. It is difficult to prepare detailed actions plans for noise mitigation measures in the absence of designated funding. The action plans operates over a five year period, while funding for noise control measures (if they are given) is typically provided for over shorter time

period. However, it is important to note that a noise action plan can be a driving force for change, and that the plan may prove to help allocation of future funds.

Recommendation
Overall there is a need for sufficient budget for realizing the noise measures in noise action plans.

Cooperation between stakeholders
One of the purposes of END is to define a common approach intended to avoid, prevent or reduce on a prioritized basis the harmful effects, including annoyance, due to exposure to environmental noise. The preparation of noise action plans is a complex process and it involves a number of different stakeholders, other administrations and authorities, the public etc. In the comments on the challenges of implementing noise action plans it was pointed out that cooperation with the relevant stakeholders was not sufficient and that there has been insufficient focus on the process of creating the plan. E.g. it seems that NRAs are looking in isolation at noise from their own roads, why there is a need for better cooperation between authorities/owners of different types of infrastructures (although this is particularly relevant in major cities). The survey shows that the vast majority of noise action plans do not take into account those situations where more than one noise source is present e.g., parallel infrastructures of different type or owner, crossings etc. It appears that consideration was given to this subject area in the UK, Ireland and Italy.

Recommendation
There is a need to improve the cooperation between the relevant stakeholders. It seems pertinent to consider how the preparation of noise action plans is designed, so that the planning of noise abatement measures are best dealt with and all noise sources taken into account. END could for example clarify that noise action plans should consider this issue, by requiring noise action plans to exploit synergies between noise and other relevant policies and planning, e.g. urban and rural planning, traffic management etc.

10 References

[1] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise

[2] http://ec.europa.eu/environment/noise/directive.htm

[3] Evaluation of the Environmental Noise Directive, Report by Eurocities Working Group Noise, September 2009

[4] Make some noise, Shadow report on implementation of the Environmental Noise Directive, Justice & Environment, 2009

[5] State of the art on noise abatement policies and tools in cities, noise abatement priorities and necessary technologies, Silence, February 2005

[6] Practitioner Handbook for Local Noise Action Plans, Silence

[7] Quality labels for the quiet rural soundscape, INTER-NOISE 2006, Dick Botteldooren and Bert De Coensel

[8] Noise Management and Abatement, CEDR 2010

[9] Guidance Note for Noise Action Planning For the first round of the Environmental Noise Regulations 2006, Environmental Protection Agency, 2009

[10] First Round of the development of the Strategic Noise Maps. Spanish Noise Action Plan SNAP 2008-2012.

[11] Final Report on Task 3. Impact Assessment and Proposal of Action Plan. May 2010

[12] Report from the Commission to the European Parliament and the Council On the implementation of the Environmental Noise Directive in accordance with Article 11 of Directive 2002/49/EC, European Commission, June 2011

[13] Dublin Agglomeration Action Plan Relating To The Assessment & Management of Environmental Noise, Dublin City, July 2008-November 2013

[14] European Union, Service Contract, ENV, C 1/SER/2002/0104R, Report on the Definition, Identification and Preservation of Urban and Rural Quiet Areas

[15] Guidelines for Road Traffic Noise Abatement, SMILE

[16] Valuation of Noise, Position Paper of the Working Group on Health and Socioeconomic Aspects, 4 December 2003

[17] Danish Ministry of Transport, External Costs of Transport, 2nd Report - Marginal external cost matrices for Denmark, July 2004

[18] Communication from the Commission. Towards a reinforced culture of consultation and dialogue - General principles and minimum standards for consultation of interested parties by the Commission, Commission of the European Communities, 11 December 2002

Annex A Questionnaire

3. January 2011

CEDR NOISE GROUP

QUESTIONNAIRE ON ACTION PLANNING ALONG MAJOR ROADS

European National Road Authorities practice and experiences with the preparation of noise action plans

Name and affiliation of the person who completed this questionnaire

Name:	
Organisation:	
Country:	
E-mail:	

OBS:
Comments and remarks that may clarify your replies are very welcome!

If you need or want to supplement your answers with some further remarks etc., please use outline 8 on page 14.

1/14

1. Implementation and responsibilities

1.1 Has the Environmental Noise Directive (END) been transposed into national legislation in your country?

Yes	☐
No	☐

If yes, please provide a link to, or a title on, the legal text

1.2 Have noise action plans been prepared for major roads in your country (in accordance to the Environmental Noise Directive)?

Yes	☐
No	☐

1.3 In relation to the requirements of END, regarding the preparation of noise action plans (for the 1st round of END) for major roads, how are "major roads" defined in your country?

1.4 How many kilometers of "major roads" (as defined in 1.3) are there in your country?

"Major roads" in total	km

1.5 How many kilometers of the State road network is "major roads" (as defined in 1.3)?

"Major roads" along the State road network	km

1.6 How many kilometers of roads in total are managed by the National Road Authority in your country?

State road network	Km

1.7 Was the National Road Authority responsible for drawing up noise action plans?

Yes	☐
No	☐

If yes, how many kilometers of roads was the National Road Authority responsible for?

Major roads outside agglomerations[1)]	km
Major roads inside agglomerations	km
Other roads	km

[1)] "agglomeration" as defined in END, with more than 250.000 inhabitans.

If no, which organisation or authority is responsible for drawing up noise action plans along roads managed by the National Road Authority?

2/14

1.8 Estimated cost of internal work within the NRA for the preparation of noise action plans

Financial cost (in €)	Time consumption (in weeks)

1.9 Estimated cost of outsourced work (in €)

1.10 Have you used any guidance note for drawing up noise action plans

Yes	☐
No	☐

If yes, please write the title on the publication or provide a link to the guidance

3/14

2. Noise indicators and their use

2.1 Which of the following noise indicators were used in the preparation of noise action plan for major roads?

L_{den} (4 meter)	☐
L_{Night} (4 meter)	☐
L_{den} (1,5 meter)	☐
L_{Night} (1,5 meter)	☐

Others, please specify

2.2 Which noise-sensitive areas do the noise action plan relate to?

Housings	☐
Summer/winter cottages	☐
Child-care institutions	☐
Institutes of education	☐
Hospitals, old peoples home etc.	☐
Recreational areas, parks, outdoor living areas	☐
Quiet areas	☐
Others, please specify:	

2.2 Are "quiet areas" defined in your country?

Yes	☐
No	☐

If yes, how are they defined?

2.3 Was exceedence of national noise limit values (binding or guiding) used as a basis for the establishment of priorities for mitigation measures in noise action plan?

Yes	☐
No	☐

If yes, please state the noise limit values for road noise, which requires National Road Authorities to consider mitigation measures

Type of surrounding	Noise indicator (i.e. L_{den})	Noise limit value dB
Housings		
Summer/winter cottages		
Child-care institutions		
Institutes of education		
Hospitals, old peoples home etc.		
Recreational areas, parks, outdoor living areas		
Quiet areas		
Others, please specify:		

4/14

If no, please mention which noise levels or else, would require a National Road Authority to consider mitigation measures (e.g. WHO´s guide lines)

2.5 State the estimated number of residential houses exposed to noise levels exceeding 55 dB (L_{den}) along major roads (as defined in 1.3)

Number of housings	

2.6 If possible, state the estimated number of residential houses exposed to noise levels exceeding the specified noise limit values (as defined in 2.4) in the action plan along major roads

Number of housings	

5/14

3. Measures, criteria's and strategies for noise abatement

3.1 What measures for reducing noise, which is under control of your organisations competence are included in the noise action plan?

Please rank in terms of to what extend the measures are used; 1= not used at all, to 5 = widely used (tick a box in each row). With regard to measures which is not within your organisations competence, do not put a mark.

	1	2	3	4	5
Reduce noise at the source					
Low-noise road surfaces	☐	☐	☐	☐	☐
Speed reduction	☐	☐	☐	☐	☐
Traffic reduction	☐	☐	☐	☐	☐
Reduction in heavy vehicles	☐	☐	☐	☐	☐
Low-noise tyres	☐	☐	☐	☐	☐
Reduce propagation of noise					
Land-use planning	☐	☐	☐	☐	☐
Noise barriers	☐	☐	☐	☐	☐
Reducing noise at the receiver					
Façade insulation	☐	☐	☐	☐	☐
Building design	☐	☐	☐	☐	☐
Others, please specify:					

3.2 What are the main criteria for selecting noise reducing measures?

Please rank in terms of importance; 1= not included as a criteria at all, to 5 = most important criteria (tick the box in each row)

	1	2	3	4	5
Noise exposure in residential areas	☐	☐	☐	☐	☐
Noise exposure in public recreational areas	☐	☐	☐	☐	☐
Ease of implementation	☐	☐	☐	☐	☐
Cost of implementation	☐	☐	☐	☐	☐
Compatible with other legislation	☐	☐	☐	☐	☐
Other criteria, please specify:	☐	☐	☐	☐	☐

3.3 Do the noise action plans along major roads include any goals or specific actions, which the competent authority intend to fulfil, within the period of the noise action plan (e.g. 2008-2013)

Yes	☐
No	☐

If yes, please mention which kind of actions are included in the noise action plan (e.g. establishment of noise-reducing initiatives, but also more soft goals e.g. about studies which will be carried out to improve the basis for noise-reduction initiatives etc.)

6/14

3.4 Do the noise action lists specific priority criteria's for the implementation of noise mitigation measures?

Yes	☐
No	☐

If yes, please briefly explain the leading principles for how the noise mitigation measures are prioritised:

3.5 Do the Noise Action Plan deal with those situations where more than one noise source is present e.g., parallel infrastructures of different type or owner, crossings and so on?

Yes	☐
No	☐

If yes: Desripe briefly how do you deal with complex scenarios where more than one noise source is present

7/14

3.6 Do the noise action plans include any financial information such as;

	Yes	No
Budgets for noise abatement	☐	☐
Cost-effectiveness assessment	☐	☐
Cost-benefit assessment	☐	☐

If yes, please provide a copy of, or link to, a document with information about the above-mentioned, or briefly describe how the noise action plan treats the subject

If no, please briefly describe why this hasn't been included in the action plan

8/14

5. Consultations with the public

5.1 Was the public consulted about the proposal for the action plan?

Yes	☐
No	☐

If yes, how was the public consulted about the proposal for the noise action plan?
(Put more cross if it's necessary)

Letter	☐
Exhibits e.g. libraries, institutions, public citizen shops etc	☐
Advertisements in newspapers	☐
Website	☐
Public meetings	☐
Other, please specify:	

If no, why not:

5.2 What was the length of the consultation period?

	Number of days
Consultation period	

5.3 How many responses to the proposal for a noise action plan did you receive?

	Number of responses
Responses in the hearing process	

5.4 Please point out to what extent you agree with the following statements about the results of the hearing.
Tick a box in each row, where 1 = strongly disagree to 5 = strongly agree

	1	2	3	4	5
It is important to consult the public about noise action plans along major roads	☐	☐	☐	☐	☐
The consultation period provided useful feedback (e.g. ideas and proposals for noise reduction)	☐	☐	☐	☐	☐
It is difficult to get the public involved	☐	☐	☐	☐	☐
The public have been given early and effective opportunities to participate in the preparation of the noise action plan	☐	☐	☐	☐	☐
Results of the participation of the public have been taken into account in the preparation of the noise action plan	☐	☐	☐	☐	☐
The public have been informed on the decisions taken in the final noise action plan	☐	☐	☐	☐	☐

5.5 In your opinion, what is the most important lesson (positive or negative) you have learned from the public consultation process?

9/14

Do you have any suggestions on how to get the best possible engagement from the public in the development and implementation of noise action plans?

10/14

6. The importance of the noise action plan

6.1 Do you feel that the noise action plan have led to greater focus on noise problems from different stakeholders?

Please give each item a number on the scale of 1 to 3, where 1 = same focus as before, 2 = little more focus, and 3 = more focus (please tick one box in each row)

	1	2	3
The public	☐	☐	☐
The press	☐	☐	☐
National politicians	☐	☐	☐
Regional/local authorities/politicians	☐	☐	☐
Your own organisation	☐	☐	☐
Others, please specify:	☐	☐	☐

Please include more details:

5.6 Please point out to what extent you agree with the following statements about the status of the noise action plan along major roads:

Tick a box in each row, where 1 = strongly disagree to 5 = strongly agree

	1	2	3	4	5
The noise action plan is mostly like a political statement where possibilities and intensions have been described at a general level	☐	☐	☐	☐	☐
The noise action plan is mostly like a plan with a set of "SMART" objectives (Specific, Measurable, Achievable, Realistic and time-fixed) with concrete actions to reduce noise	☐	☐	☐	☐	☐
The noise action plan most resembles a document which summarizes the current efforts against noise problems	☐	☐	☐	☐	☐
The noise action plan have influence on national budget (allocation of financial resources for noise abatement)	☐	☐	☐	☐	☐
The noise action plan has led to a higher level of ambition in managing and reducing noise along national roads?	☐	☐	☐	☐	☐

11/14

7. Overall experiences

7.1 Please point out to what extent you agree with the following statements.
Tick a box in each row, where 1 = strongly disagree to 5 = strongly agree

	1	2	3	4	5
The requirements from END/national legislation for preparation of noise action plans are unclear	☐	☐	☐	☐	☐
There is a need for a guidance document to support the preparation of noise action plans	☐	☐	☐	☐	☐
It is appropriate to review the noise action plan every five year	☐	☐	☐	☐	☐
The status of the noise action plan is not clear (whether it is a policy paper or a plan with concrete actions)	☐	☐	☐	☐	☐
There is a appropriate coordination between different authorities/stakeholders in developing action plans and planning specific measures	☐	☐	☐	☐	☐
The END noise mapping constitute a good enough basis for the preparation of the noise action plans	☐	☐	☐	☐	☐
There is appropriate time for the preparation of the noise action plan (the time-span between the deadline for finishing noise maps end the deadline for finishing actions plans is appropriate)	☐	☐	☐	☐	☐
The budget allocations for the preparation of the noise action plan have been appropriate	☐	☐	☐	☐	☐
There is a lack of technical expertise for the preparation of action plans	☐	☐	☐	☐	☐
There are missing accessible methods for cost-benefit analyses	☐	☐	☐	☐	☐
It is impossible to plan noise mitigation measures over a long period	☐	☐	☐	☐	☐
There are no budget allocations for noise abatement	☐	☐	☐	☐	☐

7.2 Please state the 3 main problems encountered in drawing up the action plan (in order of importance)

1.	
2.	
3.	

7.3 Do you have suggestions for how these problems (mentioned in 7.2) can be eliminated or reduced for the 2nd round of noise action planning?

1.	
2.	
3.	

12/14

7.3 Viewed retrospectively what do you think are the noise action plan's greatest flaws/weaknesses (mention in order of importance)

1.	
2.	
3.	

7.4 Do you have suggestions for how the next noise action plans could be improved?

1.	
2.	
3.	

13/14

8. Comments related to any of the questions

If you have comments related to any of the questions above, please write them here. Important: Please mention the question number before each comment

14/14

Annex B Realization of the 1st round of noise action plans in Poland

In the following there is a brief description of the experiences from Poland of the realization of the 1st round of noise action plans.

The legal basis

The obligation to produce noise action plans results from the following legal acts:

- Directive 2002/49/EC of the European Parliament and the Council of 25 June 2002 relating to the assessment and management of environmental noise (END);
- Act of 27 April 2001 – Environmental Law (consolidated text: Journal of Laws of 2008 No 25, item 150, as amended) together with implementing regulations;
- The Minister's of the Environment regulation of 14 October 2002 on the detailed requirements regarding noise action plans (Journal of Laws No 179, item 1498, as amended);
- The Minister's of the Environment regulation of 14 June 2007 on permissible levels of environmental noise (Journal of Laws No 120, item 826)[1].

The regulation of 14 October 2002 introduces three general sections, which must be included in noise action plans:

- descriptive presenting current situation in close proximity to a road, indispensable actions which must be taken to reduce noise level, schedule and cost of program;
- detailed restrictions and obligations of the government and local authorities arising from noise action plans;
- justification of the scope of noise action plans.

The above regulation introduces the "M" indicator, which determines the order of implementation of the actions which are to reduce the negative noise impact in the inhabited areas. The areas where the "M" indicator has the highest value have the priority. The "M" indicator determines the exceedance of the noise over the limit of noise level and the number of people inhabiting a particular area.

"M" indicator formula:

$M = 0.1\ m\ (10^{0.1\Delta L} - 1)$

where:

M - "M" indicator value
ΔL - noise exceed excess value in dB,
m - number of people exposed to noise over the limits.

The regulation of 14 June 2007 defines the following limits:

Type of area	L_{day} (6.00-22.00)	L_{night} (22.00-6.00)
Health centres, hospitals located outside the city centre	50 dB	45 dB
One-family houses, hospitals located in cities	55 dB	50 dB
Multi-family houses, recreational areas outside cities, farm buildings	60 dB	50 dB
City centres in cities with more than 100.000 inhabitants, with buildings close together	65 dB	55 dB

[1] Regulation of 14 June 2007 was replaced with regulation of 1 October 2012 changing the regulation of 14 June 2007 on permissible levels of environmental noise.

Authorities responsible for preparation of noise action plans
The General Directorate for National Roads and Motorways (GDNRM) is responsible only for preparing noise maps for roads with traffic heavier than 3 000 000 vehicles annually (6 000 000 vehicles annually in 1st set of maps form year 2007). Under binding legislation province marshals are responsible for elaboration of noise action plans based on GDNRM's maps. At present there are 16 provinces in Poland and each has to have noise action plans. Alike in the 1st set and in the 2nd set in each province were roads which have to be covered by noise action plans.

The scope of noise action plans
Noise action plans from the year 2009 cover 235 sections of state roads which, in total, are 1538 km long. The existing noise action plans were prepared for roads with traffic flow above 6 000 000 vehicles per year.

The French method NMPB-Routes-96 was used to prepare the first set of noise maps. All maps were prepared in scale 1:10 000 and include L_{den} and L_{night} indicators (4 m above the ground).

The roads with noise action plans based on 1st set of noise maps (marked orange).

The most significant problems connected with the implementation of noise action plans in Poland

1. Differences in the approach to the preparation of noise action plans in each province

One of the most significant problems is a high diversity of noise action plans, which were prepared in each of the 16 provinces. Action plans were outsourced by province marshals and almost all of them were prepared by different companies. Due to many different approaches and methodology, it is difficult to carry out a comprehensive analysis of the results, aims and recommendations of the plans, on the national level.

Noise action plans based on the first set of noise maps are not unified in terms of measures adapted to reduce noise. Another vital issue is the costs of implementation. The most commonly used solution in order to reduce noise levels are noise barriers. Nevertheless, the costs of noise barriers are expressed differently in each action plan; it is the price for a square metre, a linear metre or for the total length of a barrier. Moreover, in most cases it is not stated if the cost of barriers includes only the price for erecting them, or if the price includes also the project and the cost of noise analysis. Due to lack of unity of measures, the already existing noise action plans differ substantially when methodology as well as detailed analysis are considered.

Establishing detailed instructions as to the extent and scope of noise action plans would help to deal with the problem mentioned above.

2. Implemented actions are not consulted with GDNRM

Another important problem is the fact that the plans are not juxtaposed with capital plans and the budget of the GDNRM, which is the only organ responsible for carrying out noise action plans outside the agglomerations. In many cases the GDNRM was obliged to implement expensive measures set in action plans, which were not refunded from the Central Budget. Due to the lack of necessary funds GDNRM is not able to perform all of the noise mitigating measures indicated in the current action plans. For example, in one of the provinces, noise action plan obliges GDNRM to erect about 73 km of noise barriers, the entire cost of which was estimated at about EUR 125 000 000. Without any co-financing it is impossible for GDNRM to realize such a plan.

When preparing action plans, it is essential to establish close cooperation between authors of action plans and GDNRM, so that they could select proper type and scope of noise abatement measures. Simultaneously, it is necessary to provide GDNRM with additional funds from the Central Budget. Otherwise GDNRM will not be able to fulfil all plans completely.

3. There are no proper criteria for identification of the places most exposed to the impact of traffic noise

The "M" indicator implemented by the regulation of 14 October 2002 (described in point 1), in some cases is not sufficient to define the most exposed areas and consequently, it is not possible to define the order of realization of all assignments set in action plans. The "M" indicator does not include, inter alia:

- distance from the road where the noise level is measured,
- type of buildings (detached houses, multi-family houses, farm buildings),
- type of technical means of mitigation measures.

Due to the above circumstances, some action plans proposed only the "M" indicator, to determine the order of implementation noise-reduction initiatives, while in other additional indicators (chosen individually by the authors) were used as well. Consequently, the analysis provided in each action plan includes data based on different indicators.

It would be advisable to specify, which data except for the "M" indicator should be used in action plans. It would help to reach proper accuracy of the analysis and to unify data used in action plans.

4. The analysis of costs and benefits of the realization of the action plans is often inadequate

In most of valid action plans costs and benefit analysis were not done at all or they were done poorly. Often the costs and/or effectiveness of implementing each of the mitigation measures were provided only for finally chosen actions, and so it was impossible to analyse its accuracy.

The cause of such a state may be the regulation of 14 October 2002, itself. It does not specify the required elements of costs and benefit analysis thoroughly but stipulates only a general and unclear statement, that action plans must assess "ecological and economical effectiveness of mitigation measures included in action plans". It does not precise how that analysis should be carried out and what data should be included.

In present action plans the most common or the only method of abating noise is erecting noise barriers. In many cases there are no equivalent multi-criteria analysis comparing barriers with other alternative measures (e.g. noise reducing pavements).

In order to oblige the authors of action plans to carry out proper cost and benefit analysis of all mitigation measures it is necessary to specify the scope and minuteness of such analysis.

5. Depreciation of spatial planning detains new residential development in noise affected areas

Another crucial weakness of action plans measures is disregard for land-use planning on regional level, limiting development in noise affected areas**.** The advantages of spatial planning and acoustical planning in the area with exceeded limits values were almost not considered.

Currently, in Poland, in case of lack of valid spatial management plan there are no legal measures to prohibit development of new residential houses in noise affected areas. If new residential buildings are built in close vicinity of the road in areas exposed to high noise levels, GDNRM is obliged to pursue appropriate actions to tackle noise and reach the noise limits defined in the regulation of 14 June 2007.

It is crucial to extend the measures analyzed in noise action plans in order to optimize their choice and effectiveness. Furthermore, it is necessary to amend the law in a way that would encourage municipals to pursue efficient land-use policy on the noise exposed terrains in close proximity to state roads.

6. Responsibility to protect areas designed for future residential buildings

Under Polish law it is obligatory to ensure appropriate noise limits on sensitive areas as defined in spatial management plans. Thus, noise action plans introduce specific actions (mostly noise barriers) to protect undeveloped areas, which may be developed in future. Nevertheless, such development may never take place in a given area, or the measures taken now may be inadequate when those areas will be built up in the future.

In order to avoid the obligation of protecting from noise the areas which might be developed in the future, but which are not built up at present, it is indispensable to introduce amendments in the law.