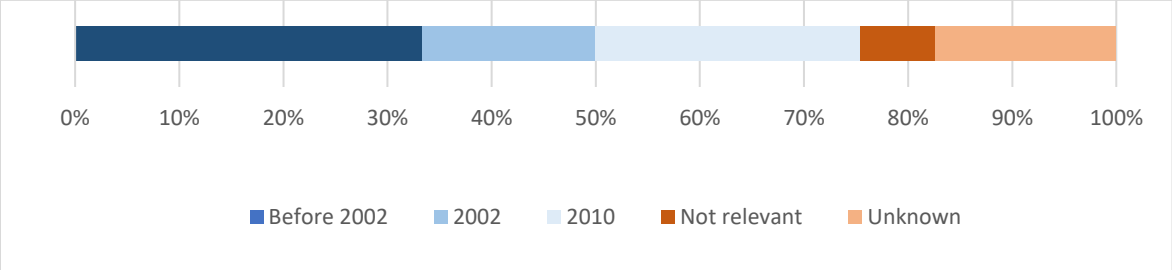
Measures to manage and reduce noise impacts: opportunities and challenges

September 2021

How long has environmental noise reduction been an important part of your country/region/city's political agenda?



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Summary

After 18 years of its implementation of the Environmental Noise Directive (END) (EU, 2002), trends between 2012 and 2017 suggest that the number of people exposed to levels of noise considered harmful to human health has not significantly been reduced. Achieving a reduction of the negative impacts of noise pollution is essential within the context of the EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

This report provides the compilation of a questionnaire sent to EIONET intending to identify the political, contextual, environmental, economic and societal challenges that countries, regions and cities face when planning and implementing measures for reducing the negative impacts of noise. About 147 answers have been provided covering 23 countries: 16 from EU27 and 23 from EEA38.

The answers reflect that the Environmental Noise Directive was an important milestone for integrating noise reduction into the political agenda. There are positive factors that facilitate the implementation of the noise reduction policies like the public opinion and awareness, technology, digitalisation or the governance. On the other site, some factors undermine the reduction of environmental noise like the size of the urban areas, overcrowding or the increased mobility demand. Financial limitation is considered the main obstacle.

Regarding future opportunities and challenges, it is very often mentioned that the instruments are there but require the political will to implement them. In this context, the newly published zero-pollution action plan aims to achieve a 30 % reduction in the number of people chronically disturbed due to noise from transport by 2030. There are mixed feelings about the impact of this target, very often considered not realistic.

Acknowledgements

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1 Introduction

The Environmental Noise Directive (END) (EU, 2002) sets legally binding obligations to reduce and manage environmental noise. Noise sources, as defined by the END, include major roads with more than three million vehicle passages a year; major railway with more than 30 000 train passages per year; major airports with more than 50 000 movements per year (a movement being a take-off or a landing), excluding those purely for training purposes on light aircraft; and noise from roads, railways, airports and industries inside of agglomerations -part of a territory, delimited by the Member State, having a population in excess of 100 000 persons and a population density such that the Member State considers it to be an urbanised area.

After 18 years of its implementation, trends between 2012 and 2017 suggest that the number of people exposed to levels of noise considered harmful to human health has not significantly been reduced and, therefore, generally remained stable across most of the noise sources (EEA, 2020).

The aim of this questionnaire is to identify the political, contextual, environmental, economic and societal challenges that countries, regions and cities face when planning and implementing measures for reducing the negative impacts of noise. Achieving a reduction of the negative impacts of noise pollution is important within the context of the EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'[1], which aims to reduce the number of people chronically disturbed due to noise from transport by 30 % until 2030. To achieve the zero-pollution ambition, noise action plans should be integrated into the sustainable urban mobility plans and should include extensions of clean public transport and more active mobility.

The survey is structured around a series of potential challenges and opportunities as follows:

- Understanding the drivers and inhibitors of environmental noise reduction and its impacts
- Understanding the drivers and inhibitors of developing effective noise action plans
- Understanding future opportunities and challenges for reducing environmental noise and its impacts

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827

2 Questionnaire

The questionnaire was developed together with the European Topical Center on Air Pollution, Transport, Noise and Industrial Pollution, and the European Environment Agency. It was conducted using the in European Commission EU survey platform (https://ec.europa.eu/eusurvey/home/welcome). This platform conforms to the policy on the protection of personal data by the EU Community institutions. The survey was distributed to the EIONET noise NRC network on 28 May 2021. Eionet participants were also asked to distribute the questionnaire to other relevant local/regional representatives in their country. The questionnaire was also distributed across Eurocities. The survey was in English and it was estimated to take about 40 minutes to complete Annex I provides the questionnaire that has been distributed.

Annex I provides the questionnaire that was distributed.

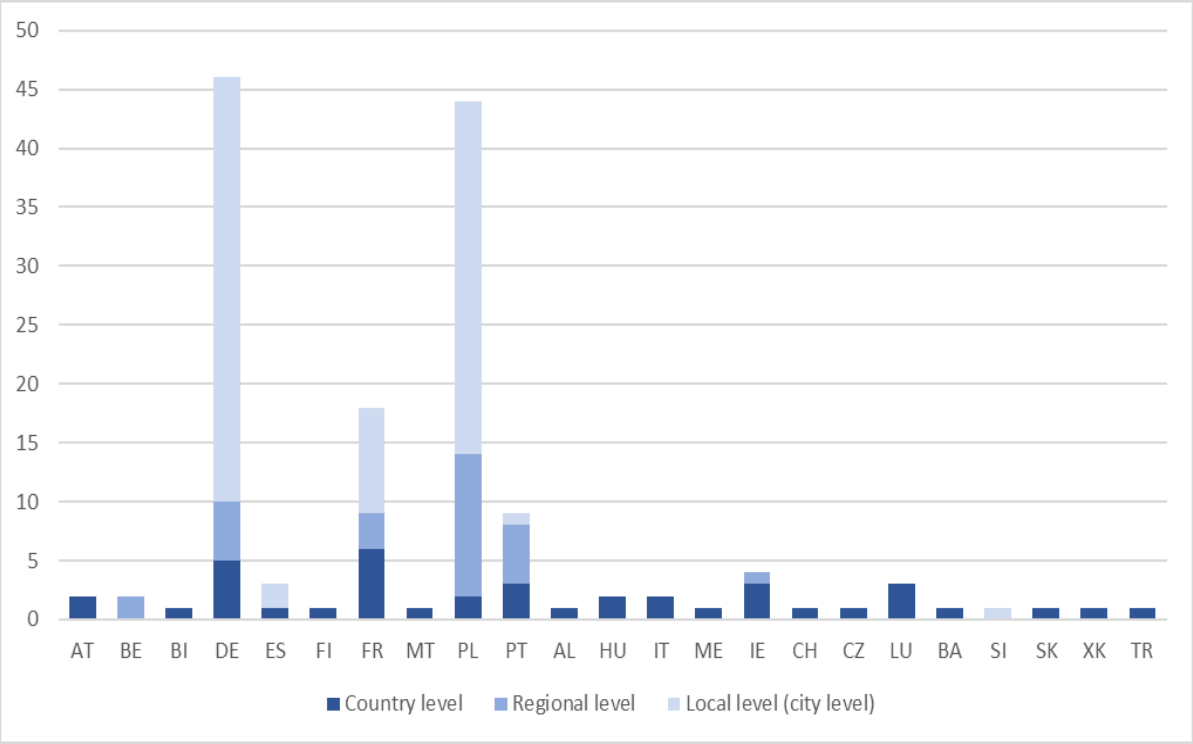
3 Coverage and profile of answers

About 147 answers have been provided covering 23 countries: 16 from EU27 and 23 from EEA38 (Figure 3.1).

As mentioned before, the questionnaire was sent to NRCs. However, the NRCs further distributed the questionnaire in the corresponding country to the relevant experts. Therefore, the answers provided reflect different administrative coverage: most of the answers correspond to the local level (54 %, Figure 3.1), followed by country level (27 %) and, finally, regional level (19 %).

The distribution of the administrative level is quite heterogenous: answers at the local level are concentrated in three countries: Germany, Poland and France. A similar situation occurs with answers at the regional level, mainly provided by Poland, Germany, Portugal and France.

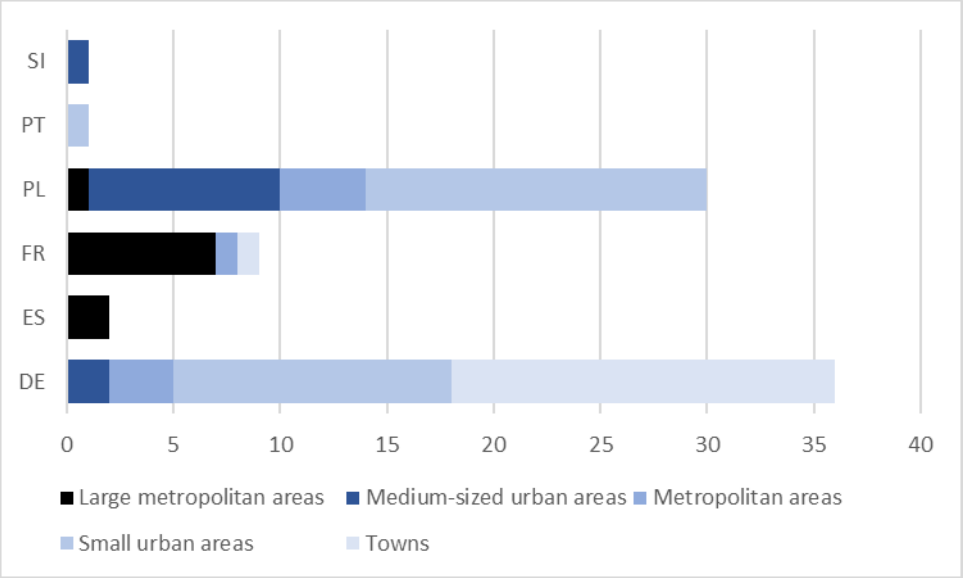
Figure 3.1: Coverage of answers to the survey by country and administrative level



The cities covered by the answers have been classified according to their size following the nomenclature of OECD (2012) :

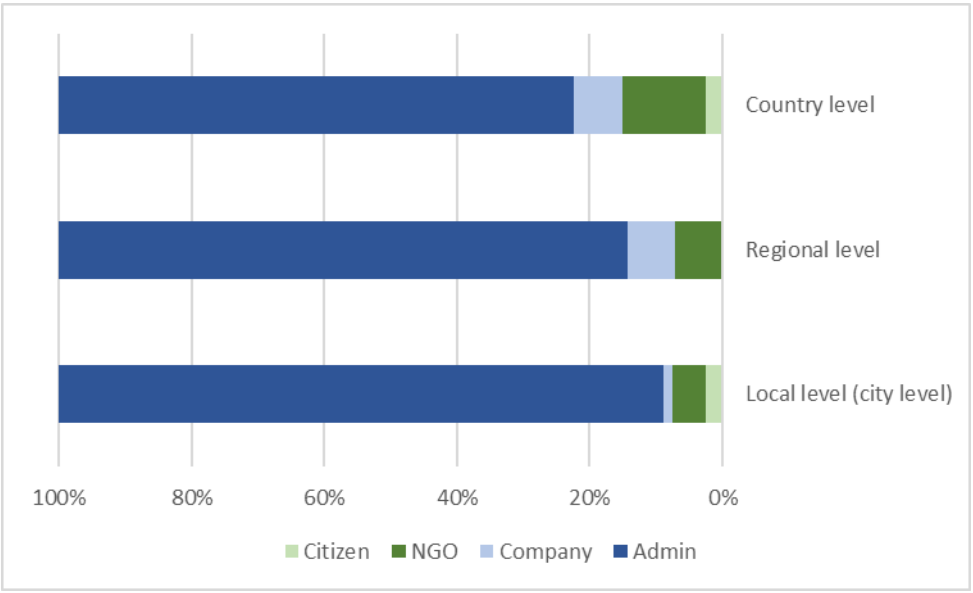
- Large metropolitan areas : > 1,5 million inhabitants (13 % of the answers, Figure 3.3)
- Metropolitan areas : 500 000 to 1,5 million (10 %)
- medium-sized urban areas : 200 000 to 500 000 (15 %)
- small urban areas: 50 000 to 200 000 (38 %)
- towns : < 50 000 (24 %).

Figure 3.2: Typology of cities included in the answers to the questionnaire. Large metropolitan areas: > 1,5 million people; Medium-sized urban areas: 500 000 – 1,5 million; Metropolitan areas: 200 000 – 500 000; Small urban areas: 50 000 – 200 000; Towns; < 50 000 (ECD, 2012)



Most of the experts that answered the questionnaire were from the local, regional and national administration (86 %, Figure 3.3). Although, we only targeted local authorities, through the distribution of the questionnaire we also received 10 responses from NGOs, 6 responses from citizens and 6 responses from industry.

Figure 3.3: Level of experts that have answered the questionnaire by administrative level



4 Understanding the drivers and inhibitors of environmental noise reduction and subsequent impacts

4.1 Noise challenges

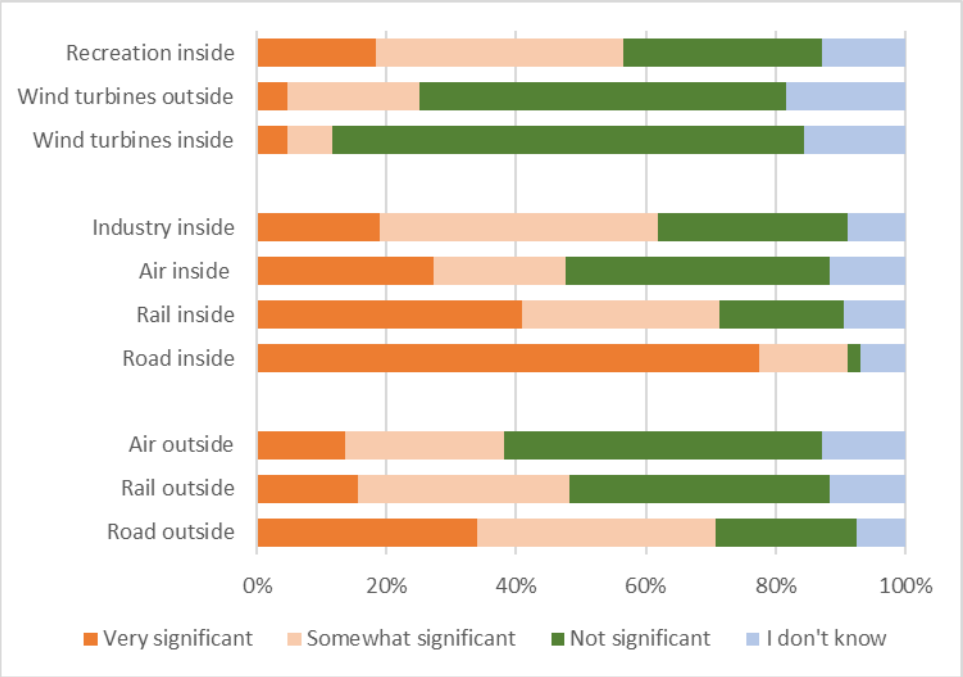
According to the responses, the environmental noise sources that present major challenges agree with the data provided by the END (Figure 4.1). Therefore, roads are the source with greater challenges, followed by rail, air and industry (inside agglomerations). This pattern is similar in both outside agglomerations and inside agglomerations. However, about 49 % of respondents consider that industry inside agglomerations is somewhat relevant although it is the source with the lowest percentage of people exposed (EEA, 2020).

Two additional noise sources which are out of the focus of the END have been included given its relevance:

- Recreation inside agglomerations. This noise source is creating some conflicts inside the cities, and it is perceived as very significant or slightly significant by 56 % of the respondents.
- Wind turbines. Since wind turbines are located in rural areas, the challenge is perceived as higher outside agglomerations (30 %). However, most of the respondents do not consider it a challenge.

There is a significant difference between responses provided at the country or regional level compared to responses at a local level: challenges outside agglomerations always are lower for respondents at local level.

Figure 4.1: How significant are the following noise challenges for your city, region or country? Inside refers to inside agglomeration. Outside, refers to outside agglomerations



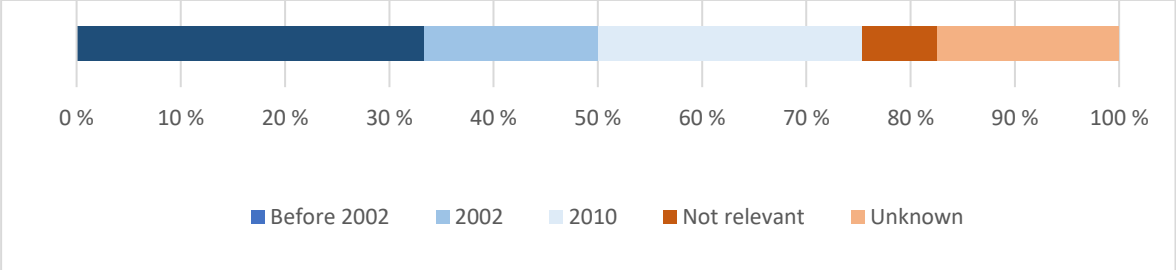
4.2 Timeframe of implementation of environmental noise policies

The Environmental Noise Directive (2002) was an important milestone for integrating noise reduction into the political agenda. However, about 33 % of the answers mentioned that environmental noise was already relevant before 2002 (Figure 4.2). The END impact can be seen on 17 % of the responses

where noise entered in their political agenda in 2002 and the 25 % in 2010. This also reflects a low speed of implementation of the END, since the first reporting was due in 2005.

There are no significant differences between the administrative levels, showing that national and European policies drive environmental noise policies that impact lower administrative levels.

Figure 4.2: How long has environmental noise reduction been an important part of your country/region/city's political agenda?



4.3 Impact of existing policies

4.3.1 Policies in place that supported environmental noise reduction

About 26 % of the responses did not mention any policy (16 % did not answer and 10 % mentioned no policy supporting environmental noise). When policies are mentioned, about 60 % of the responses refer to policies derived from the transposition of the END in their country (e.g. noise mapping).

Under the concept "policies", a wide range of approaches and practices are included:

- Specific measures
  - Incentives for electric vehicles
  - Building insulation
- Regulations
  - Noise protection zones
  - Low emissions zones
  - Municipal ordinances
  - National limit values
- Legislation
  - Legislation existing before the implementation of the END
  - Legislation in relation to the noise of engines
  - Environmental protection law
- Financing instruments. Financing instruments are perceived as critical for environmental noise reduction since it is mentioned very often as one obstacle (see next section).
- Planning. Probably these are the most interesting cases since they provide an integrated perspective with a mid-long term view:
  - Local environmental programmes. Environmental programmes developed at the city level integrate different environmental issues developing common approaches to benefit from the synergies between specific measures. Citizen participation and communication are usually key elements. Some referred cities in the questionnaire: Lodz, Olsztyn, Orly, Zabzre, and Lubljana.

- Integrated strategic development. These relate to the mid-long term perspective on city planning with an integrated view on several environmental issues towards coordinated action. Ireland 2040[2] is an example.

4.3.2 Policies in place that undermined environmental noise reduction

The largest group of respondents (33 %) mentioned that no policy undermined environmental noise reduction. Additionally, 34 % of the respondents provided no answer.

Only 30 % of the respondents provided information on policies that undermine environmental noise reduction. Answers are listed according to their frequency (more relevant first):

- Lack of financial support. This is seen as critical to implementing noise reduction policies since noise mapping and noise reduction measures are costly. In many cases, they are not a priority.
- No enforcement of existing regulations.
- Planning. Spatial planning and transport planning have not led to the desired level of environmental noise reduction.
    - Transport planning. Many transport policies do not adequately integrate their impact on noise since other priorities are more relevant, like mobility or economic development.
    - Land use planning
        - Policies oriented to densification may have a side effect on increasing noise.
        - Noise is not integrated into urban planning because of a lack of awareness among planners and involved stakeholders.
        - The need for housing decrease the level of noise restrictions.
        - Historic architecture in the cities prevents the introduction of some solutions to reduce noise, e.g. acoustic screens.
- Recreation is mentioned mainly at a local level.
    - As a consequence of the COVID, more space has been given to bars and restaurants.
    - Opening hours of leisure activities
    - Difficulty in addressing neighbourhood and leisure noise in noise regulation. Conflicts between rights.
- Wind turbines are an emerging noise issue since they conflict with the energy goals of decarbonisation of energy.

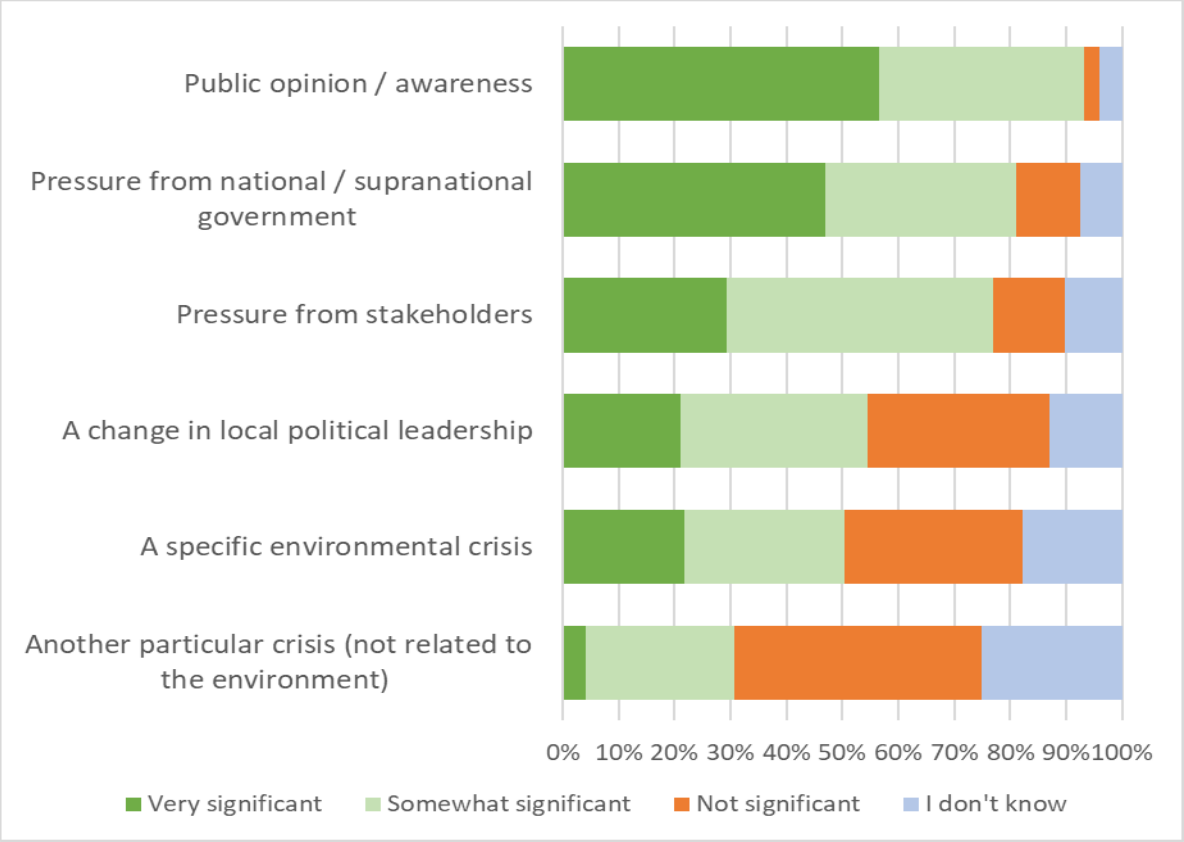
4.4 Triggers in making environmental noise reduction objectives an important part of the political agenda

Public opinion and awareness is by far the most important factor that triggers environmental noise protection (92 % of answers; Figure 4.3), followed by pressure from governments (82 %) and stakeholders (78 %). Therefore, the pressure from governments, which is linked to the implementation of the END, is an important factor but reinforced by the opinion of several actors.

[2] https://npf.ie/

On the other side, environmental crisis, non-environmental crisis and change in political leadership are the factors considered less significant in triggering noise policies. Those are also the ones with higher unknowns.

Figure 4.3: Triggers in making environmental noise reduction objectives an important part of the political agenda



4.5 Contextual factors that supported or inhibited environmental noise reduction

Contextual factors are relevant since they cannot be easily changed or not changed at all in the case of the geographic setting. Therefore, those factors that inhibit environmental noise reduction are an important obstacle, difficult to overcome.

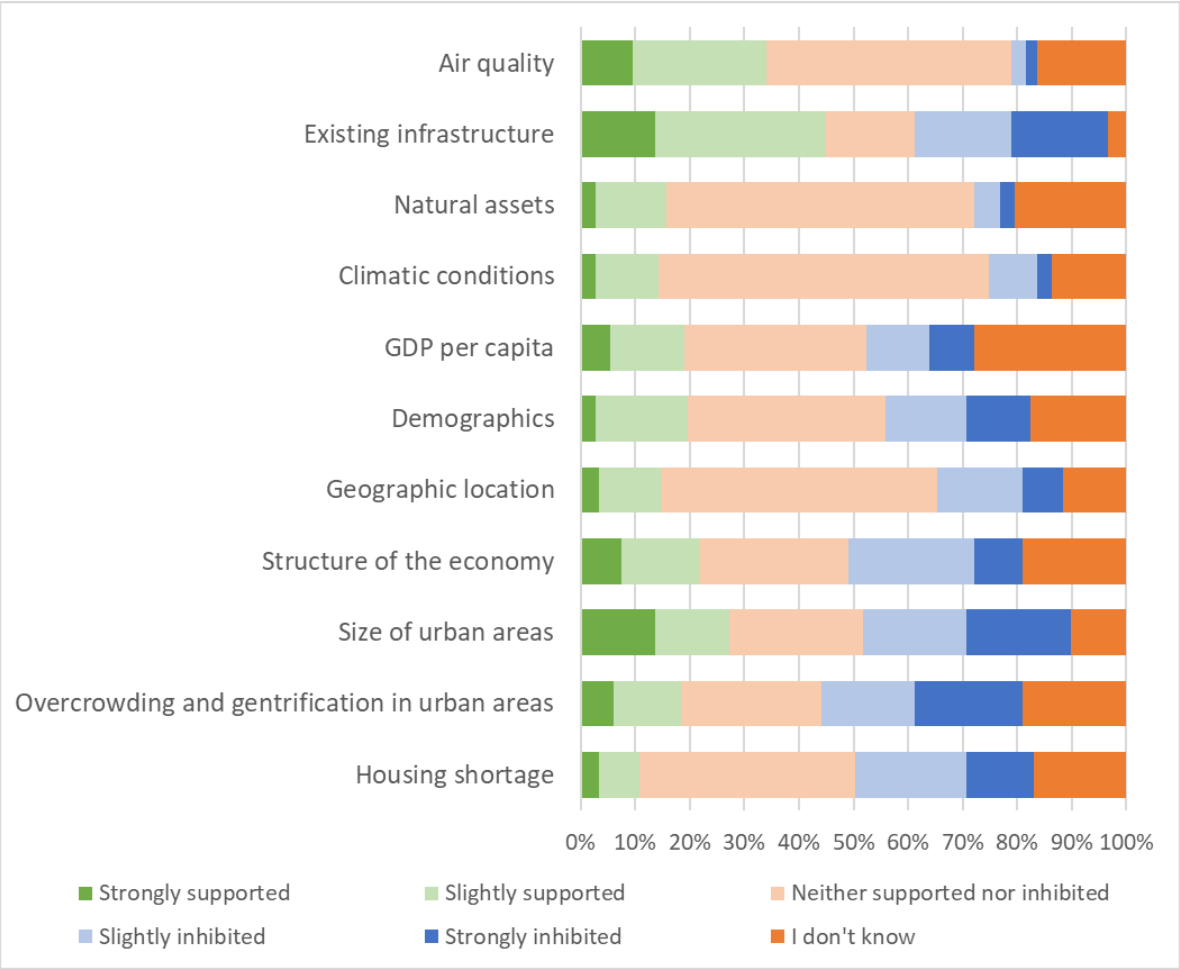
There are only four factors that are considered to be more relevant as supporting than inhibiting environmental noise reduction: existing infrastructure (45 %), air quality (36 %), natural assets and climatic conditions —the latter two factors around 15 % (Figure 4.4). However, existing infrastructure (e.g. public transport network) is also considered as an inhibiting factor by 35 % of the responses.

The most inhibiting factors are related to the structure of the city (housing shortage, overcrowding, size of urban areas) and the structure of the economy.

Some responses depend on the administrative level considered:

- GDP per capita is considered both a supporter and an inhibitor at the country level, while it is not relevant at a regional and local level.
- City size is considered a negative factor, mainly at the country level. Within the cities, it is only regarded as negative in large metropolitan areas.

Figure 4.4: Contextual factors that supported or inhibited environmental noise reduction



4.6 Governance

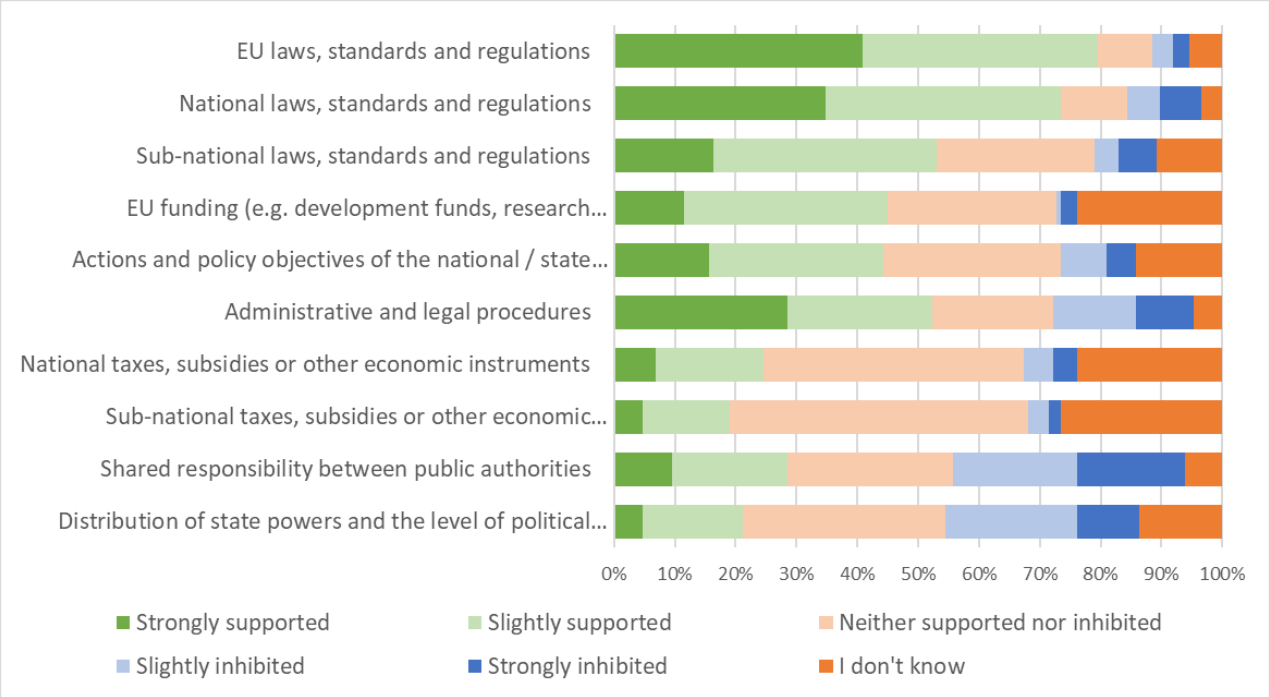
Factors related to governance are analysed at two levels: national and local level.

4.6.1 Factors related to national governance that supported or inhibited environmental noise reduction

The three most relevant factors supporting noise reduction are laws and regulations at the European, national and sub-national levels (Figure 4.5). In addition, administrative and legal procedures are largely perceived as positive (52 %), although 25 % of the answers considered a problem for noise reduction.

The distribution of state powers and shared responsibilities between public authorities are the identified as major inhibiting factors.

Figure 4.5: Factors related to national governance that supported or inhibited environmental noise reduction



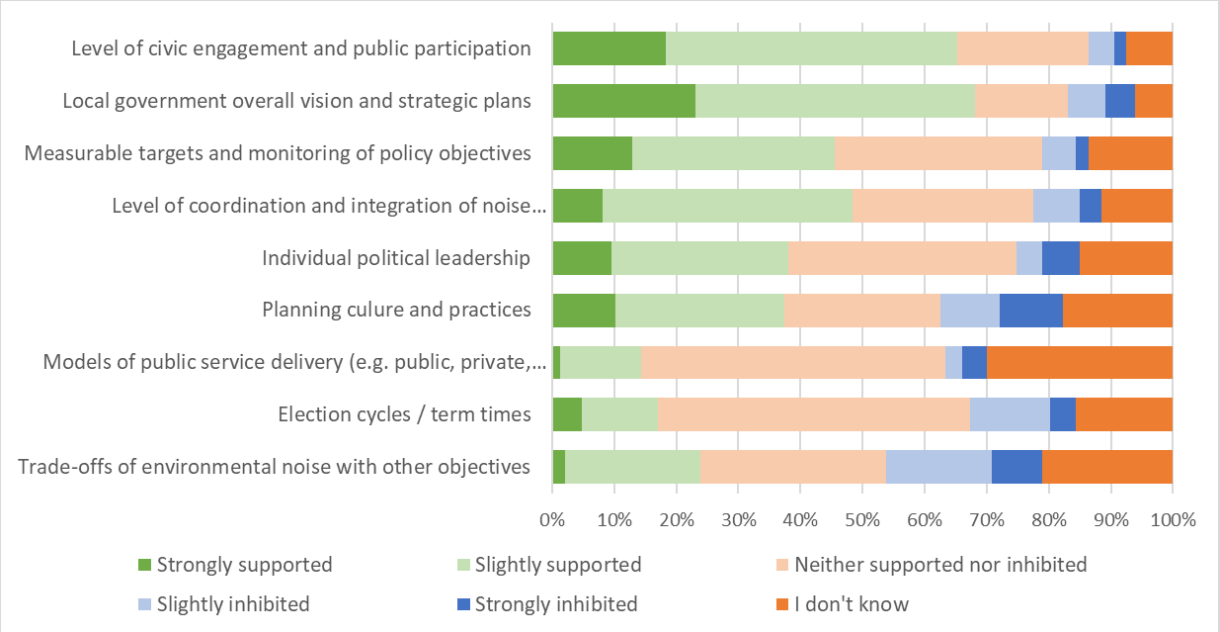
4.6.2 Factors related to local governance that supported or inhibited environmental noise reduction

Level of civic engagement and local government overall vision and strategy are considered the most relevant factors that support noise policies by more than 50 % of the answers (Figure 4.6). Contrarily, noise trade-offs with other objectives and planning cultures are considered the major obstacles to noise reduction.

The following factors present significant differences between administrative level :

- Models of public service delivery (e.g. public, private, public-private partnership) are predominantly considered as inhibitors only at regional level (18 % compared to 6 % at country level and 4 % at local level).
- Planning culture and practices are considered largely as a negative factor at country level (40 %), while it is considered more as a positive factor at regional (25 %) and local level (49 %).

Figure 4.6: Factors related to local governance that supported or inhibited environmental noise reduction



4.7 Factors related to transport and mobility that supported or inhibited environmental noise reduction

Most of the factors related to transport and mobility are considered to affect the reduction of noise positively. Low carbon technologies, low noise technologies in vehicles, increased use of active modes and societal changes related to mobility are considered very relevant by more than 50 % of the answers.

According to the respondents, increased mobility demand is by far the factor that more inhibits noise reduction.

4.8 There is a high coincidence in all the responses at all administrative levels. Factors related to knowledge and behaviours that supported or inhibited environmental noise reduction

Almost all the factors listed in the survey are considered to support noise reduction. The major obstacle is seen in the willingness of citizens to adopt new behaviours and practices. However, this is only considered as an obstacle at country level (35 %) compared to regional (18 %) and local level (16 %).

Figure 4.7: Factors related to transport and mobility that supported or inhibited environmental noise reduction

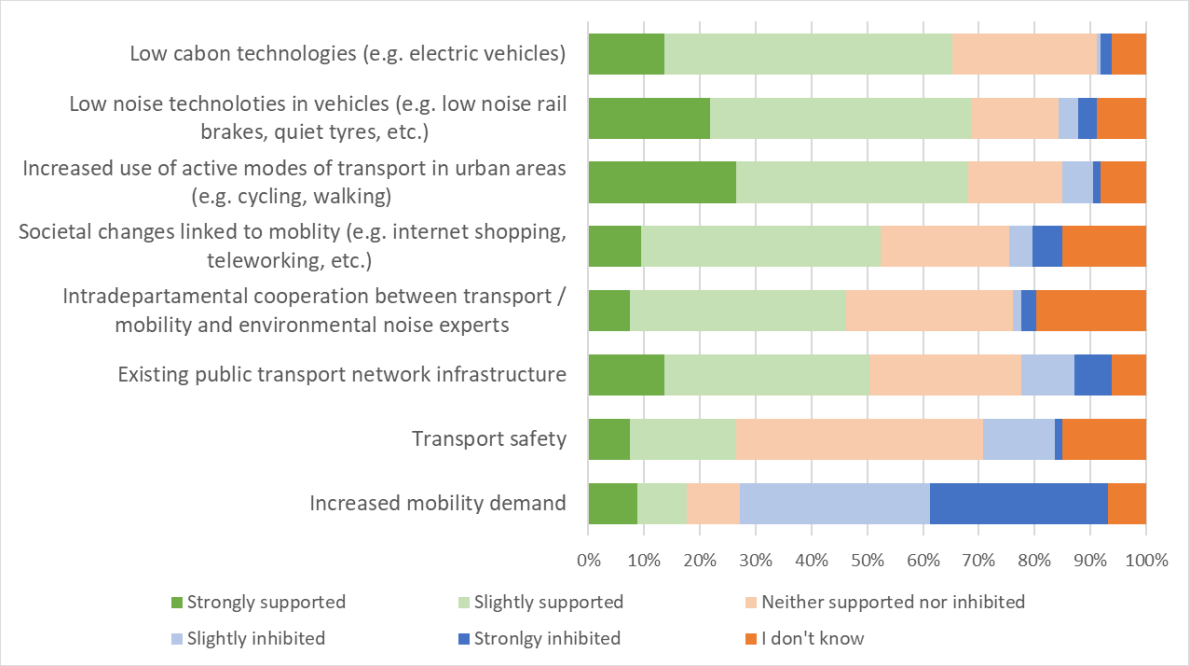
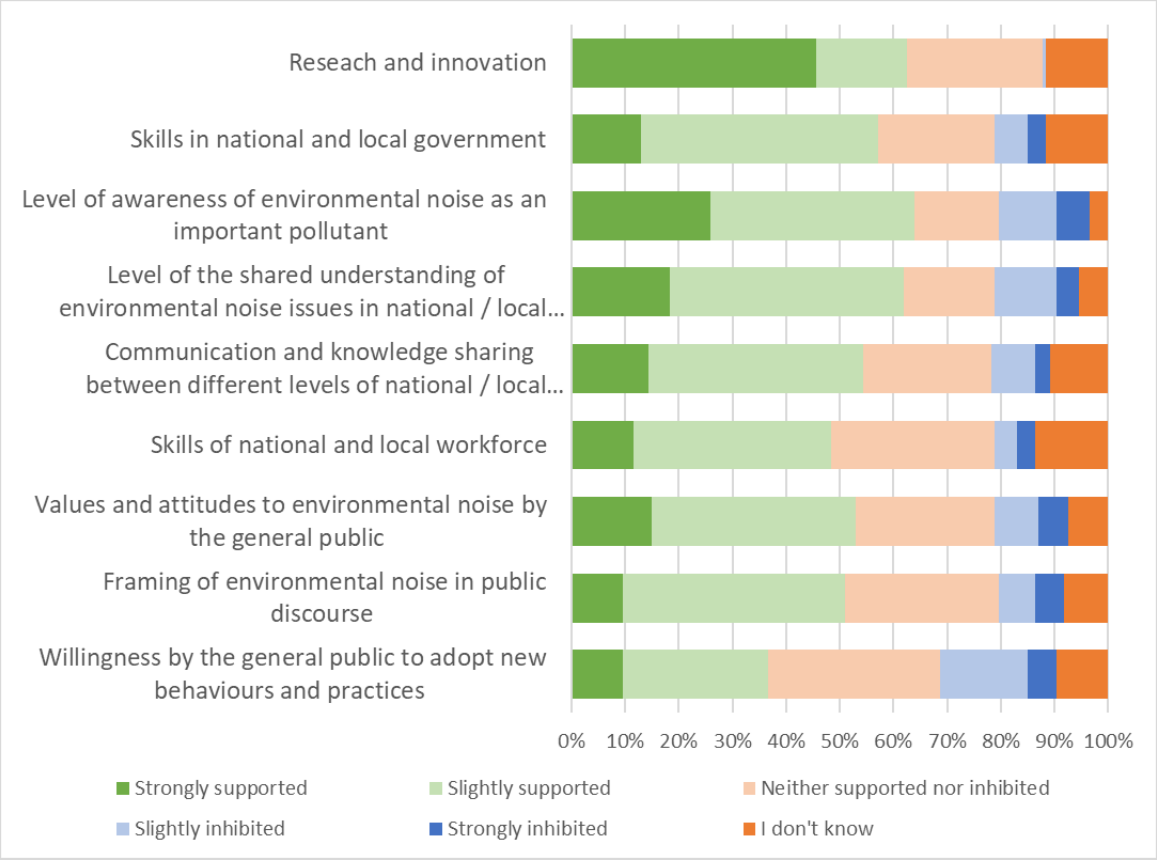


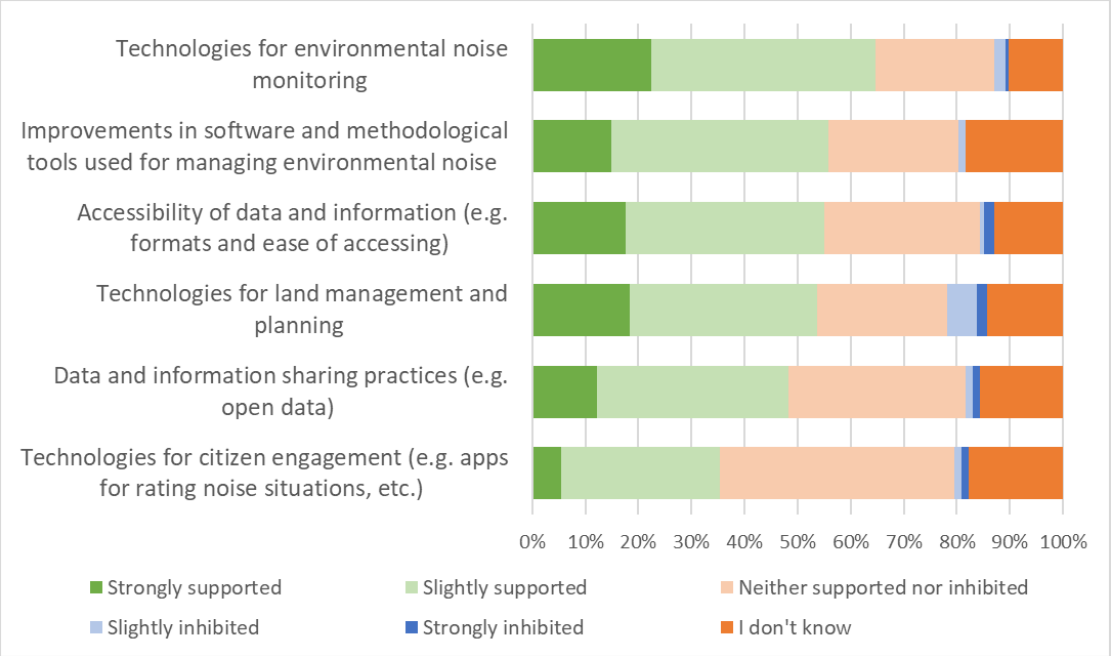
Figure 4.8: Factors related to knowledge and behaviours that supported or inhibited environmental noise reduction



4.9 Factors related to technology and digitalisation that supported or inhibited environmental noise reduction

All of the factors considered are perceived as positive for noise reduction. There is a clear consensus since the consideration as inhibiting factors is consistently below 10 %.

Figure 4.9: Factors related to technology and digitalisation that supported or inhibited environmental noise reduction



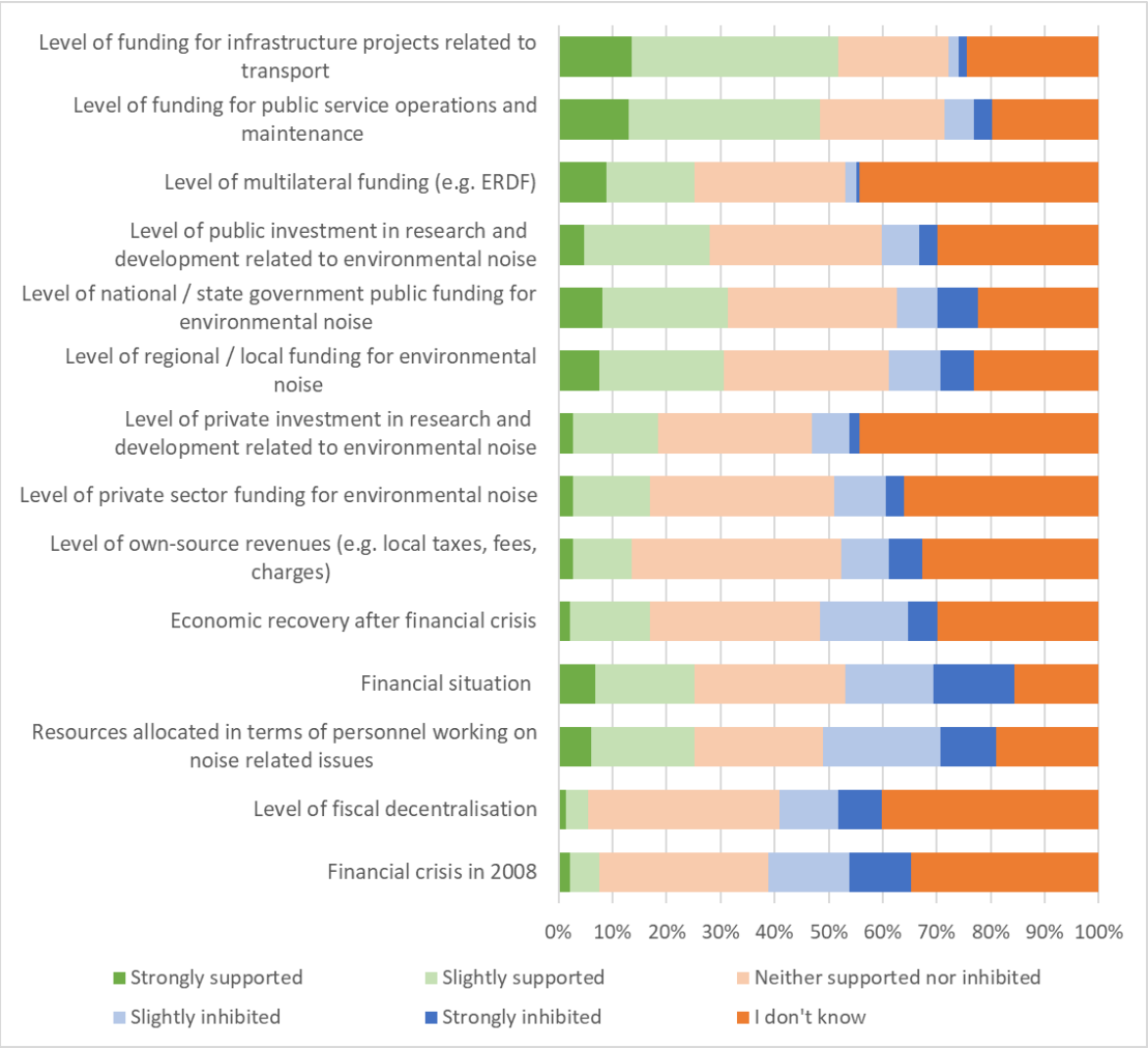
4.10 Financing

4.10.1 Factors related to financing that supported or inhibited environmental noise reduction

The level of funding for infrastructure projects related to transport and public service operations are the main factors that facilitate noise reduction.

On the other side, the resources allocated to personnel working on noise-related issues and economic context (financial crisis, financial situation, economic recovery) are identified as inhibitors of noise reduction.

Figure 4.10: Factors related to financing that supported or inhibited environmental noise



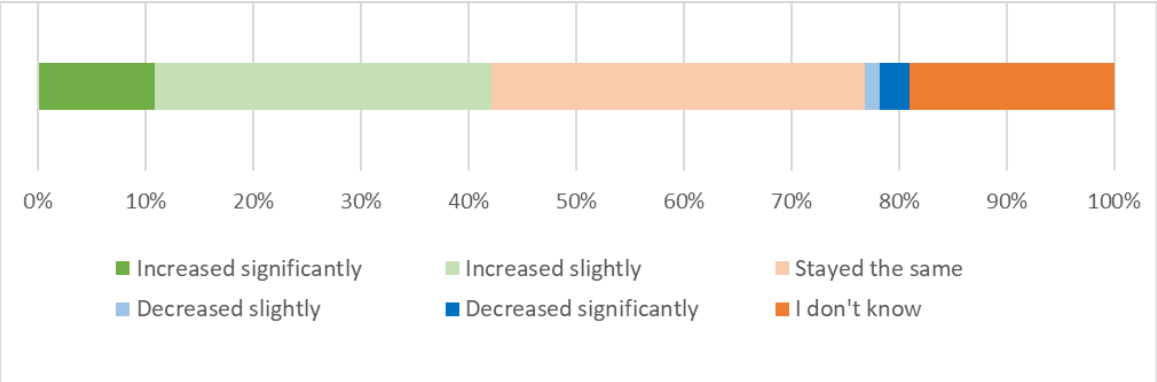
4.10.2 Change on environmental noise management and mitigation expenditure over the past 10 years

Over the past ten years, noise management and mitigation expenditure have slightly or significantly increased according to 43 % of the responses, while staying the same in 35 % of the cases.

Most of the increase is mentioned at the country level (48 %) and local level (44 %), while 46 % of cases remained the same at regional level.

Considering the size of the city, most of the increase of expenditure is observed in cities above 200 000 inhabitants (45 %) while in smaller cities remained the same (52 % of cases).

Figure 4.11: Change on environmental noise management and mitigation expenditure over the past 10 years



4.11 Summary of the drivers and inhibitors of environmental noise reduction and subsequent impacts

Table 4.1 provides a summary of the previous sections. Only the most relevant answers have been highlighted, i.e. those above 50 % of agreement or the top 3 answers with more agreement if less than 50 %

Table 4.1: Summary of drivers and inhibitors of environmental noise reduction and consequent impacts. Only the most relevant impacts are included. Percentage of answers (total number of answers = 147). In blue, impacts, identified by more than 50 % of the respondents

Drivers/inhibitors	Positive impact	Negative impact
Impact of existing policies	• Environmental protection law (33 %) • Transposition of END (16 %) • Local environmental programmes (15 %) • Financing instruments (13 %)	• No policy undermined (33 %) • Transport planning (7 %) • Land use planning (9 %) • Lack of enforcement (5 %)
Triggers	• Public opinion and awareness (92 %) • Pressure from national/supranational governments (82 %) and stakeholders (78 %)	
Contextual factors	• Existing infrastructure (45 %) • Air quality (36 %)	• Size of urban areas (38 %) • Overcrowding (37 %) • Existing infrastructure (35 %) • Housing shortage (33 %)
National governance	• Laws and regulations at the European (89 %), national (73%) and sub-national levels (53 %) • Administrative and legal procedures (52 %)	• Shared responsibilities between public authorities (38 %) • Distribution of state powers (32 %)
Local governance	• Local government overall vision and strategy (68 %) • Level of civic engagement (65 %)	• Noise trade-offs with other objectives (25 %) • Planning cultures (20 %)
Transport and mobility	• Low noise technologies in vehicles (69 %) • Increased use of active modes and (68 %) • Low carbon technologies (65 %) • Societal changes related to mobility (52 %)	• Increased mobility demand (68 %)

Drivers/inhibitors	Positive impact	Negative impact
Knowledge and behaviours	• Level of awareness of environmental noise as an important pollutant (64 %) • Research and innovation (63 %) • Level of the shared understanding of environmental noise issues in national/local government (62 %) • Skills in national and local government (57 %) • Communication and knowledge sharing between different levels of national/local government (54 %) • Values and attitudes to environmental noise by the general public (53 %) • Framing of environmental noise in public discourse (51 %)	• Willingness by the general public to adopt new behaviours and practices (22 %)
Technology and digitalisation	• Technologies for environmental noise monitoring (65 %) • Improvements in software and methodological tools used for managing environmental noise (56 %) • Accessibility of data and information (e.g. formats and ease of accessing) (55 %) • Technologies for land management and planning (54 %)	
Financing	• Level of funding for infrastructure projects related to transport (52 %) • Level of funding for public service operations and maintenance (48 %)	• Resources allocated in terms of personnel working on noise related issues (32 %) • Financial situation (31 %)
Change on environmental noise management and mitigation expenditure over the past 10 years	• Increased (42 %)	• Decreased (4 %)

5 Understanding the drivers and inhibitors of developing effective environmental noise action plans

5.1 Preparation and approval of noise action plans

The preparation and approval of noise action plans is a complex process that may include interdepartmental cooperation or the consideration of other elements beyond the END requirements.

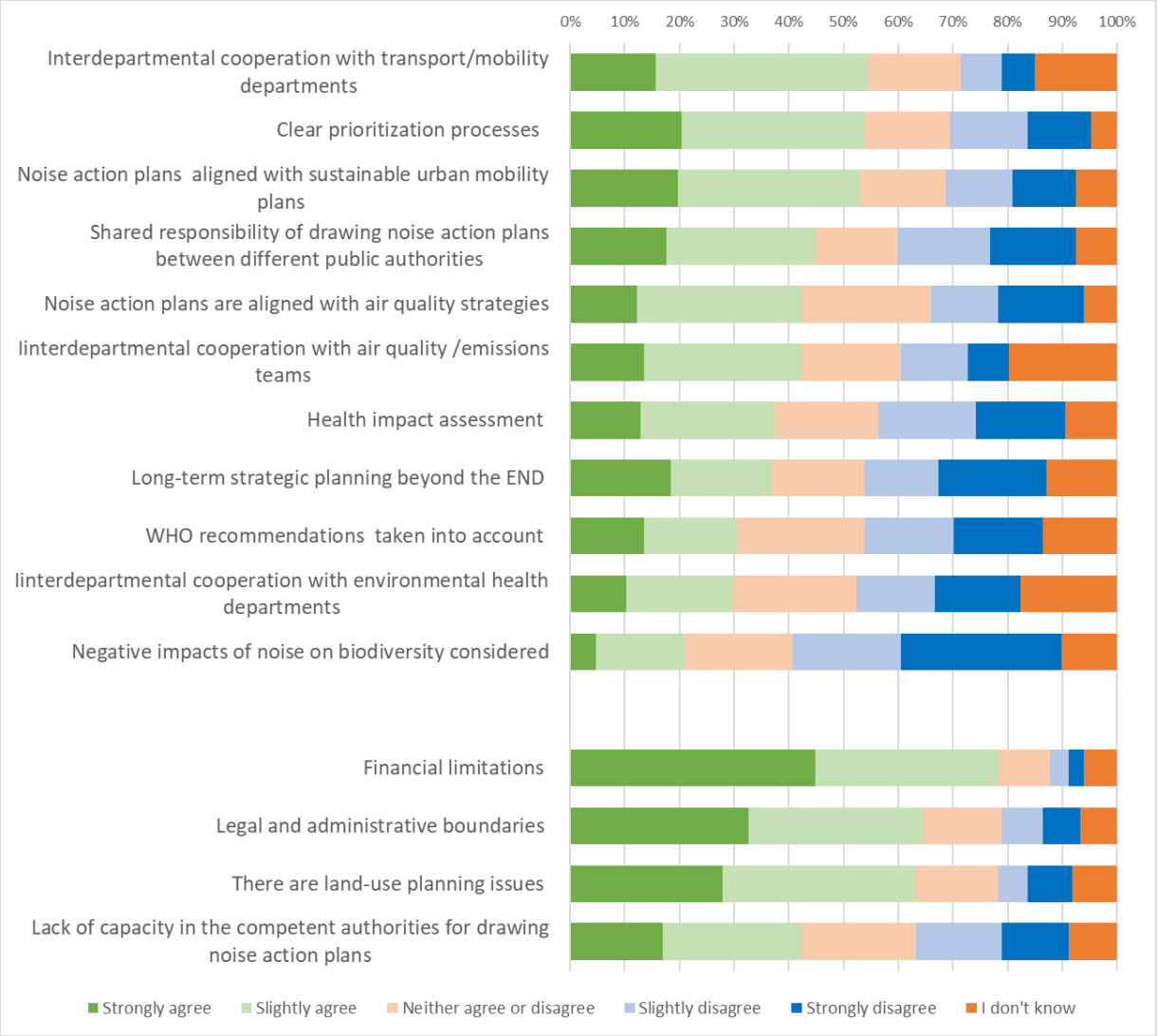
More than 50 % of responses reflect that there is interdepartmental cooperation with transport/mobility, the prioritisation process is clear, and that noise action plans are aligned with urban sustainability plans.

On the other side, negative impacts on biodiversity are not considered in 52 % of cases.

There are mixed situations where the number of cases where a specific topic is considered during the planning process is similar to the answers that mention that it is not considered: inclusion of health impact assessment, consideration of WHO recommendations, or long-term planning. This variety of responses reflect the heterogeneity of situations and factors that involve the development of noise action plans.

Considering the factors that may hamper planning and approval of noise action plans, financial limitations, legal administrative boundaries, and land use planning issues are mentioned in more than 60 % of cases.

Figure 5.1: Thinking about the preparation and approval process for environmental noise action plans, please indicate how much you agree or disagree on the following statements. The figure includes two groups: the first group are positive aspects, while the second group include negative aspects that can undermine the preparation of the noise action plans



5.2 Implementation of noise action plans

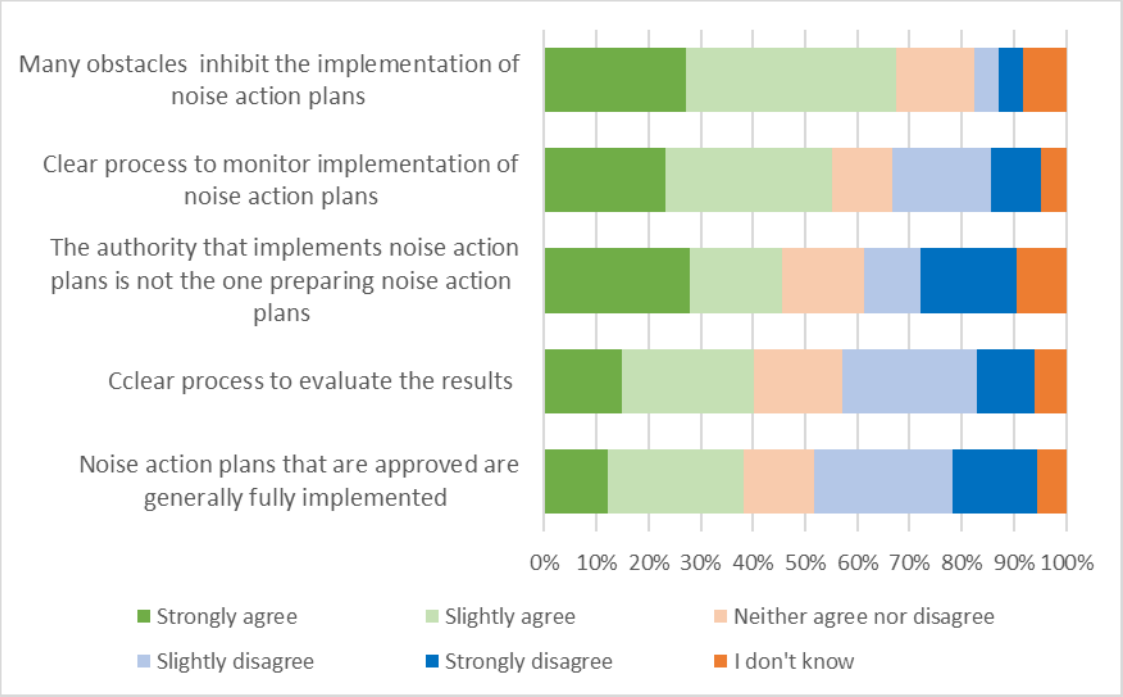
As we have seen in the previous sections, the preparation and approval process is complex, given the number of actors and administrations involved. Therefore, the implementation of the noise action plans is not straightforward: about 67 % of the responses agree that many obstacles inhibit the implementation of noise action plans.

On the positive side, about 57 % agree that there is a clear process to monitor the implementation of action plans -although 29 % disagree with this statement.

Evaluating the implementation of action plans is essential for their revision, understanding the efficiency of taken measures and consideration in a further update. There are mixed results: 40 % consider that there is a clear evaluation process, against 37 % that disagree. However, there is a different perception depending on the administrative level: about 45 % of answers at the country and regional level consider that there is not a clear evaluation process, whereas 32 % consider that it

is; at the local level, 47 % respond that the evaluation process is clear while 29 % not. Furthermore, among the urban areas, half of the large metropolitan areas (> 1,5 million) consider that the evaluation process is not clear (50 %). The rest of the cities have a different perspective; about 57 % consider the evaluation process clear.

Figure 5.2: Thinking about the implementation of noise action plans in your country/region/city, please indicate how much you agree or disagree with the following statements



6 Understanding future opportunities and challenges

This section provides an overview of the future opportunities and challenges of reducing environmental noise and subsequent impacts. In contrast with the previous section on drivers, structured with closed answers, this part of the questionnaire was framed with open questions in order to grasp the input from the stakeholders better.

In terms of achievements of significant importance when it comes to delivering environmental noise reduction and reducing the negative impacts of noise, the following answers were provided:

- Aspects related to the preparation and implementation of noise action plans
    - Development of a systematic approach to environmental noise reduction measures
    - Noise mapping
    - Noise monitoring, in particular in airports.
    - Implementation of specific measures: noise barriers, improved road pavement, building insulation, speed limit, and implementation of quiet areas.
- Regarding transport, the increased use of active modes of transportation, the improvement of the public transport network and the fleet are considered the main achievements.
- Improvement on the health and quality of life of the people in cities.
- Increased awareness by the administration and citizens. This is reflected, for example, in the more frequent use of noise maps by different stakeholders

However, significant challenges remain, which are very much in line with the ones identified in the previous section on drivers:

- Several responses (%) consider that significant challenges are effectively implementing noise reduction measures and enforcing the law. Therefore, the instruments and measures are well-identified and are available but require the political will to implement them.
- Lack of economic capacity to implement noise reduction measures at the local level.
- In terms of governance, competencies fragmented between different administrations challenge the management of environmental noise.
- Assessment of multi-sources impact noise.
- Reduction of noise emissions to the levels recommended by the WHO.
- Concerning spatial planning overcrowding and the lack of space in the city are the major challenges.
- Aircraft noise and road are frequently mentioned as the more problematic sources. Aircraft noise involves several administrations which may conflict with their interests (e.g. economic development vs environmental quality). For road noise, the (increased) use of the private car is a major issue.

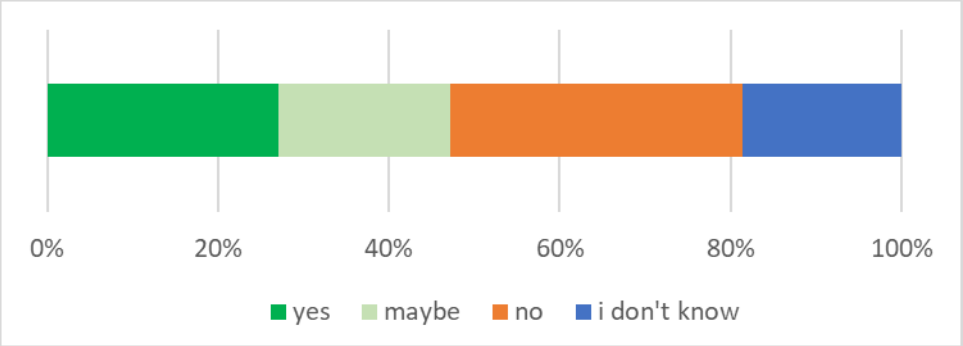
Within this context, the newly published Zero-Pollution Action Plan[3] aims to achieve a 30 % reduction in the number of people chronically disturbed due to noise from transport by 2030. About 34 % of the answers were very sceptical about the achievement of this goal, which is higher than the 27 % that think it is realistic. There is also uncertainty (39 % that don't know or responded that maybe).

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400&qid=1623311742827

The main obstacles identified are the volume of car traffic and the economic costs. Moreover, stronger cooperation between different stakeholders such as administration, NGO, companies is also required.

Finally, it is considered relevant to set specific goals, even if they are not achievable. However, more clarity is requested on how this 30 % reduction will be measured.

Figure 6.1: One of the ambitions of the newly published zero-pollution action plan is to achieve a 30 % reduction in the number of people chronically disturbed due to noise from transport by 2030. Do you think this ambition is achievable?

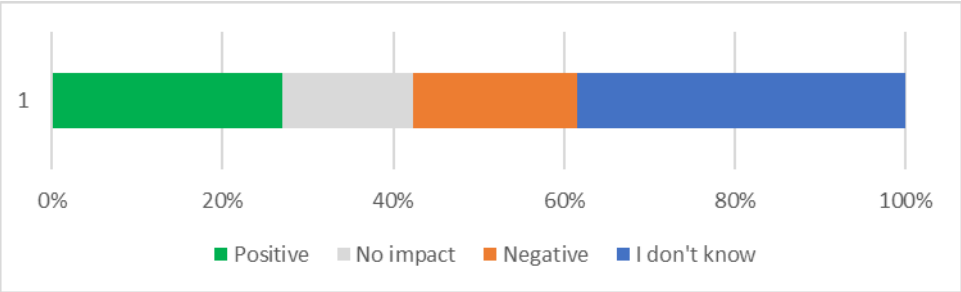


The COVID has been a disruptor of the overall system, given the measures taken that impacted all economy and daily life levels. Most of the taken measures had an impact on the traffic and consequently on environmental noise. The question is to what extent these changes will have a positive impact as a learning process, or we will go back to the former « normal ».

About 38 % consider high uncertainty and, therefore, they don’t know the future impact yet. On the other side, 28 % consider that there will be a positive impact.

The major obstacles that may lead to a negative impact are the increase of private cars during the recovery period and changing priorities on the budget towards the recovery of the economy.

Figure 6.2: How do you think the COVID-19 crisis will affect the future political, transport, technical, financial, and behavioural aspects linked to the reduction of environmental noise?



7 Feedback from the EIONET Noise NRC webinar "Challenges, opportunities, and good practices for reducing exposure to noise"

The results included in this report were presented at the EIONET Noise NRC webinars held on October, 2021.

The following points were discussed during the workshop:

- One of the conclusions of the questionnaire is that financing is very often a barrier. However, the EC representative suggests that lack of financing may not the main problem of noise reduction.
- Pilot studies in Limerik (Ireland) were proven to help trigger and secure funding for low noise asphalts. Other local authorities could take the same approach.
- As highlighted by local authorities and other survey respondents, long-term goals are not always considered in noise action plans. Local authorities work only on short-medium term goals and a longer vision would be beneficial
- In terms of noise reduction, measures such as noise barriers are mainly helpful in addressing hot spots. Most people exposed to levels above the WHO recommendations are exposed in the band 55-60 dB. Therefore, the most effective measures would be the ones that address that part of the population. It was suggested that to achieve the 30 % reduction in people affected by noise, the relevant stakeholders need to agree on which are the the priorities, i.e. if to reduce people affected by higher levels of noise or if to reduce people affected by lower levels.

8 Main conclusions

The main conclusions extracted from the questionnaires received are outlined below :

- Road traffic noise inside agglomerations was identified as the most significant challenge.
- The Environmental Noise Directive (END) has facilitated the integration of environmental noise into national and local policies.
- Noise mapping, financing instruments, regulations and local environmental programmes were identified as policies that facilitated the reduction of environmental noise.
- Public awareness and pressure from national/supra-national government, as well as from other stakeholders, were identified as triggers in making environmental noise reduction an important part of the political agenda.
- Contextual factors inhibiting environmental noise reduction were city size, overcrowding, infrastructure and housing shortage. Contrarily air quality demands and standards were identified as supporting noise reduction.
- Factors supporting noise reduction related national governance were EU laws, national laws, standards and regulations. At local level the factors supporting noise reduction identified were local government overall vision, Level of civic engagement and Level of coordination and integration of noise environmental objectives with other sectors.
- There was a strong agreement that low carbon technologies, low noise technologies in vehicles, increased use of active modes of transport and societal changes related to mobility supported environmental noise reduction.
- Increase in mobility demand was identified as an inhibitor.
- There was a wide agreement that factors related to technology and digitalisation supported environmental noise reduction
- Mixed results were found on factors related to financing that supported or inhibited environmental noise. The results are highly dependent on country/region/city.
- Most respondents state that implementation of action plans is a challenge
- There is a wide agreement between respondents that there is a clear prioritization processes for choosing the measures, there is Intdepartmental cooperation with transport/mobility departments and there is also generally alignment with sustainable urban mobility plans. It was found that there are wide differences between countries, regions and cities, and therefore more work should be done. For instance, not all noise action plans include a health impact assessment , not all of them take into consideration the WHO guidelines, there are some countries in which there is not an alignment with air quality strategies etc. The responses show that action plans don’t consider negative impacts of noise on biodiversity, respondents state that there are financial limitations during the preparation and approval process, there is no long-term strategic planning beyond the Environmental Noise Directive, there is no cooperation with environmental health departments, there are land-use planning stoppers, and there are legal and administrative boundaries.

9 References

EEA, 2020, *Environmental Noise in Europe -2020*, EEA Report No 22/2019, European Environment Agency. https://www.eea.europa.eu/publications/environmental-noise-in-europe.

Annex 1
Survey. Measures to reduce and manage noise impacts: opportunities and challenges

Responding to this survey:

Replies may be submitted in English language only. The survey should take about 40 minutes to complete. However, when responding to the questions you might wish to consult your colleagues, thus responding to the questionnaire might take longer. You may interrupt your session at any time and continue answering at a later stage. If you do so, please remember to keep the link to your saved answers, as this is the only way to access them. Once you have submitted your answers online, you will be able to download a copy of the completed questionnaire.

The survey is being conducted together with the European Topical Center on Air Pollution, Transport, Noise and Industrial Pollution, and the European Environment Agency.

Privacy statement:

This survey is conducted using the EU Commission's platform EUSurvey. This platform conforms to the policy on the protection of personal data by the EU Community institutions. The responses will be compiled in an ETC-Eionet report. A workshop with the noise NRCs and relevant stakeholders will be organised to discuss the results. Personal data such as name and e-mail will not be shared/disclosed with third parties and will only be used to reach you if we have any questions about your responses. The answers will therefore be anonymous. For further information, please read the specific privacy statement of this webpage.

If you encounter any issue while responding to the survey, or if you would like to get in touch about this questionnaire, please contact Nuria Blanes: Nuria.Blanes@uab.cat or Eulalia Peris: Eulalia.Peris@eea.europa.eu

1. Contact details

We may use your contact information to reach you if we have any questions about your responses.

	Response
Name and Surname	
E-mail	
Organisation	
Job title	

Please indicate if your responses are at:

- ○ Country level
- ○ Regional level
- ○ Local level (city level)

Please indicate the name of your country / region / city:

2. Understanding the drivers and inhibitors of environmental noise reduction and subsequent impacts

2.1 How significant are the following noise challenges for your city, region or country?

	Very significant	Somewhat significant	Not significant	I don't know
Road traffic noise outside agglomerations	○	○	○	○
Rail traffic noise outside agglomerations	○	○	○	○
Air traffic noise outside agglomerations	○	○	○	○
Road traffic noise inside agglomerations	○	○	○	○
Rail traffic noise inside agglomerations	○	○	○	○
Air traffic noise inside agglomerations	○	○	○	○
Noise from industrial sources inside agglomerations	○	○	○	○
Noise from wind turbines inside agglomerations	○	○	○	○

Noise from wind turbines outside agglomerations	○	○	○	○
Noise from recreational activities inside agglomerations	○	○	○	○
Other	○	○	○	○

If other, please specify:

Note: In this questionnaire, unless stated otherwise, environmental noise is defined according to the END "unwanted or harmful outdoor sound created by human activity such as noise emitted by different means of transport – road traffic, rail traffic, air traffic- and industrial activity".

2.2. How long has environmental noise reduction been an important part of your country/region/city's political agenda?

- ○ Since before the Environmental Noise Directive was introduced in 2002 ○ After the Environmental Noise Directive was introduced in 2002
- ○ Only in the last decade (2010-2020)
- ○ Environmental noise reduction is an important part of the country/region/city's political agenda, but I cannot specify when they became important.
- ○ Environmental noise reduction is NOT an important part of the country/region/city's political agenda.

2.3 Are there any policies your country/ region/ city has put in place (current or historic) that have significantly supported your country/ region/ city's achievement of environmental noise reduction? Please list up to three in order of significance.

2.4 Are there any policies your country/ region/ city has put in place (current or historic) that have significantly undermined your country/ region/ city's achievement of environmental noise reduction? Please list up to three in order of significance.

2.5 In your opinion, how important were/are the following triggers in making environmental noise reduction objectives an important part of your country/region/city's political agenda?

	Very significant	Somewhat significant	Not significant	I don't know
A specific environmental crisis	○	○	○	○
Another particular crisis (not related to the environment)	○	○	○	○

A change in local political leadership	○	○	○	○

Pressure from national / supranational government				
Pressure from stakeholders				
Public opinion / awareness				
Other				

If other please specify:

2.6 In your opinion, have the following **contextual factors** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Size of urban areas						
Housing shortage						
Existing infrastructure (e. g. public transport network)						
GDP per capita						
Structure of the economy						
Demographics						
Level of overcrowding and gentrification in urban areas						
Geographic location (e. g. coastal, mountainous)						
Climatic conditions						
Natural assets						
Air quality						
Other						

If other, please specify:

Please provide any additional comments on how contextual factors have either supported or inhibited environmental noise reduction in your country/region/city.

2.7 In your opinion, have the following factors related to **national governance** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Administrative and legal procedures	○	○	○	○	○	○
Shared responsibility between public authorities	○	○	○	○	○	○
Distribution of state powers and the level of political decentralisation	○	○	○	○	○	○
EU laws, standards and regulations	○	○	○	○	○	○
National laws, standards and regulations	○	○	○	○	○	○
Sub-national laws, standards and regulations	○	○	○	○	○	○
EU funding (e.g. development funds, research programmes)	○	○	○	○	○	○
National taxes, subsidies or other economic instruments	○	○	○	○	○	○
Sub-national taxes, subsidies or other economic instruments	○	○	○	○	○	○
Actions and policy objectives of the national / state government	○	○	○	○	○	○
Other	○	○	○	○	○	○

If other, please specify:

2.8 In your opinion, have the following factors related to **local governance** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Local government overall vision and strategic plans	○	○	○	○	○	○
Individual political leadership	○	○	○	○	○	○
Election cycles / term times	○	○	○	○	○	○
Level of civic engagement and public participation	○	○	○	○	○	○
Measurable targets and monitoring of policy objectives	○	○	○	○	○	○
Level of coordination and integration of noise environmental objectives with other sectors	○	○	○	○	○	○
Trade-offs of environmental noise with other objectives	○	○	○	○	○	○
Planning culure and practices	○	○	○	○	○	○
Models of public service delivery (e.g. public, private, public-private partnership)	○	○	○	○	○	○
Other	○	○	○	○	○	○

If other, please specify:

Please provide any additional comments on how governance has either supported or inhibited environmental noise reduction in your country/region/city.

2.9 Have the following factors related to **transport and mobility** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Stronlgy inhibited	I don't know
Increased mobility demand	○	○	○	○	○	○
Transport safety	○	○	○	○	○	○
Low cabon technologies (e. g. electric vehicles)	○	○	○	○	○	○
Low noise technoloties in vehicles (e.g. low noise rail brakes, quiet tyres, etc.)	○	○	○	○	○	○
Increased use of active modes of transport in urban areas (e.g. cycling, walking)	○	○	○	○	○	○
Societal changes linked to moblity (e.g. internet shopping, teleworking, etc.)	○	○	○	○	○	○
Intradepartamental cooperation between transport / mobility and environmental noise experts	○	○	○	○	○	○
Existing public transport network infrastructure	○	○	○	○	○	○
Other	○	○	○	○	○	○

If other, please specify:

Please provide any additional comments on how mobility/transport factors have either supported or inhibited environmental noise reduction in your country/region/city.

2.10 Have the following factors related to **knowledge and behaviours** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Reseach and innovation	○	○	○	○	○	○
Skills in national and local government	○	○	○	○	○	○
Skills of national and local workforce	○	○	○	○	○	○
Communication and knowledge sharing between different levels of national / local government	○	○	○	○	○	○
Level of awareness of environmental noise as an important pollutant	○	○	○	○	○	○
Level of the shared understanding of environmental noise issues in national / local government	○	○	○	○	○	○
Framing of environmental noise in public discourse	○	○	○	○	○	○
Values and attitudes to environmental noise by the general public	○	○	○	○	○	○
Willingness by the general public to adopt new behaviours and practices	○	○	○	○	○	○
Other	○	○	○	○	○	○

If other, please specify:

Please provide any additional comments on how knowledge and behaviours have either supported or inhibited environmental noise reduction in your country/region/city.

2.11 Have the following factors related to **technology and digitalisation** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Technologies for environmental noise monitoring	○	○	○	○	○	○
Technologies for land management and planning	○	○	○	○	○	○
Improvements in software and methodological tools used for managing environmental noise	○	○	○	○	○	○
Technologies for citizen engagement (e.g. apps for rating noise situations, etc.)	○	○	○	○	○	○
Data and information sharing practices (e.g. open data)	○	○	○	○	○	○
Accessibility of data and information (e.g. formats and ease of accessing)	○	○	○	○	○	○
Other	○	○	○	○	○	○

If other, please specify:

Please provide any additional comments on how technology and digitalisation has either supported or inhibited environmental noise reduction in your country/region/city.

2.12 Have the following factors related to **finance** supported or inhibited environmental noise reduction in your country/region/city?

	Strongly supported	Slightly supported	Neither supported nor inhibited	Slightly inhibited	Strongly inhibited	I don't know
Financial crisis in 2008	○	○	○	○	○	○
Economic recovery after financial crisis	○	○	○	○	○	○
Financial situation of the country / region / city	○	○	○	○	○	○
Resources allocated in country / region / city in terms of personnel working on noise related issues	○	○	○	○	○	○
Level of fiscal decentralisation in your country / region / cisy	○	○	○	○	○	○
Level of own-source revenues (e.g. local taxes, fees, charges)	○	○	○	○	○	○
Level of multilateral funding (e.g. European Regional Development Fund; United Nations - Multilateral Fund)	○	○	○	○	○	○
Level of national / state government public funding for environmental noise	○	○	○	○	○	○
Level of regional / local funding for environmental noise	○	○	○	○	○	○
Level of private sector funding for environmental noise	○	○	○	○	○	○
Level of public investment in research and development related to environmental noise	○	○	○	○	○	○

Level of private investment in research and development related to environmental noise						

Level of funding for infrastructure projects related to transport						
Level of funding for public service operations and maintenance (e.g. public transport, public transport infrastructures)						
Other						

If other, please specify:

Please provide any additional comments on how finance has either supported or inhibited environmental noise reduction in your country/region/city.

2.8 Over the past 10 years, how has the proportion of your country/region/city's budget/expenditure on environmental noise management and mitigation changed?

- Increased significantly
- Increased slightly
- Stayed the same
- Decreased slightly
- Decreased significantly
- I don't know

2.9 What are the top three spending priorities to achieve environmental noise reduction in your country /region/city?

3. Understanding the drivers and inhibitors of developing effective environmental noise action plans

3.1 Thinking about the preparation and approval process for environmental noise action plans in your country/region/city, please indicate how much you agree or disagree with the following statements:

	Strongly agree	Slightly agree	Neither agree or disagree	Slightly disagree	Strongly disagree	I don't know

There are clear prioritisation processes in place that help in choosing noise reduction and management interventions	○	○	○	○	○	○
A health impact assessment is conducted as part of the noise action planning process	○	○	○	○	○	○
The WHO recommendations are taken into account for preparing and choosing noise reduction and management interventions	○	○	○	○	○	○
The negative impacts of noise on biodiversity are taken into account in noise action plans	○	○	○	○	○	○
Noise action plans are aligned with sustainable urban mobility plans	○	○	○	○	○	○
Noise action plans are aligned with air quality strategies	○	○	○	○	○	○
There are financial limitations that compromise the scope and type of interventions that can be planned	○	○	○	○	○	○
There are legal and administrative boundaries that limit the scope and the type of interventions that can be planned	○	○	○	○	○	○
There are land-use planning issues that limit the scope and the type of interventions that can be planned	○	○	○	○	○	○
There is interdepartmental cooperation with transport /mobility departments	○	○	○	○	○	○
There is interdepartmental cooperation with air quality /emissions teams	○	○	○	○	○	○
There is interdepartmental cooperation with environmental health departments	○	○	○	○	○	○

There is a shared responsibility of drawing noise action plans between different public authorities						
There is lack of capacity in the competent authorities for drawing noise action plans						
There is a long-term strategic planning beyond the END to reduce environmental noise in the country/region/city						

Please provide any additional comments on drivers and obstacles of the noise action planning process in your country/region/city.

3.2 Thinking about the implementation of noise action plans in your country/region/city, please indicate how much you agree or disagree with the following statements:

	Strongly agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Strongly disagree	I don't know
There is a clear process to monitor implementation of noise action plans						
Noise action plans that are approved are generally fully implemented						
There is a clear process to evaluate the results of noise action plans after their implementation						
There are many obstacles that inhibit the implementation of noise action plans						
The authority that implements noise action plans is not the one preparing noise action plans.						

Please provide any additional comments on drivers and obstacles of the implementation of noise action plans in your country/region/city.

4. Understanding future opportunities and challenges for reducing environmental noise and subsequent impacts

4.1 What do you believe your country/region/city has achieved that has been of significant importance when it comes to delivering environmental noise reduction and reducing the negative impacts of noise?

4.2 What do you think are the biggest challenges and opportunities that your country/region/city faces in the coming ten years in terms of environmental noise pollution?

4.3 One of the ambitions of the newly published zero-pollution action plan is to achieve a 30 % reduction in the number of people chronically disturbed due to noise from transport by 2030. Do you think this ambition is achievable in your country/region/city, and how will your country/region/city be able to meet this objective over this period?

4.4 How do you think the COVID-19 crisis will affect the future political, transport, technical, financial, and behavioural aspects linked to the reduction of environmental noise?

4.5 Do you have any additional comments you would like to share?

Thank you very much for all your answers!

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