



LIFE Project Number
LIFE2009 ENV/IT/000102

FINAL Report (technical aspects)
Covering the project activities from 01/10/2010 to 30/06/2014

Reporting Date
30/09/2014

LIFE+ PROJECT NAME or Acronym
***Noise Abatement Demonstrative and Innovative Actions and
information to the public (NADIA)***

Project location	Italy (Liguria, Veneto, Toscana and Umbria Regions)
Project start date:	01/10/2010
Project end date:	31/12/2013 Extension date: 30/06/2014
Total Project duration (months)	39 Extension months 6
Total budget	€ 2.110.608
EC contribution:	€ 695.304
(%) of total costs	32,94
(%) of eligible costs	50

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Project Website	www.nadia-noise.eu

Instructions:

Please refer to the Common provisions Articles (administrative and financial article) for the legal basis on what a final report must contain.

The final report must be submitted to the Commission not later than 3 months after the project end date.

One electronic version of the report is sufficient. It must be sent in identical versions to the Commission and to the monitoring team. If relevant, it must also be sent to the national authority.

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2. Executive Summary

• **Project objectives**

The project objectives are related to technical and educational and awareness raising aspects:

- to demonstrate the technical and economic feasibility and the effectiveness of best practices for reducing the road traffic noise levels, thanks to the integration of noise mapping and planning activities, innovative techniques (noise barriers, windows, asphalts) and education;
- to demonstrate the effectiveness of the involvement of the stakeholders and the correct communication to the public for increasing the awareness on traffic noise emissions and their effects on health and quality of life and the responsibility and contributing to the AEN workgroup's activities;
- to realise an integrated model based on NMPB model, considering the population distribution, the meteorological data, the ground nature for allowing a more effective noise monitoring of noise and its propagation;
- to give a contribution for the innovation and the reliability of models in cooperation with national and European working groups;
- to valorise the project activities and results in terms of education and sensitisation of pupils;
- to widely disseminate the results during and at the end of the project, at local, national and European level and to prepare the communication activities after the project conclusion.

• **Description of actions**

The project consists in 7 actions

Action 1 is the project management (see below)

Action 2 (SURVEY) concerns the following aspects:

1. collection of data related to the noise levels along the infrastructures in the project areas, population distribution, meteorological conditions, characteristics of ground, etc.
2. collection of data on noise annoyance in some specific positions in the project areas;
3. analysis of noise propagation models with particular reference to the recurring problems and their causes which affect the noise mapping activities;
4. realisation of noise measurement campaigns for integrating the available data;
5. deepening of the state of the art of noise reduction systems among those which are based on sustainable solutions (landscape compatibility, recycled materials, etc.).

1. Data are provided by the project partners but also by other competent authorities, such as the regional environmental agencies.

2. A study on the noise annoyance is foreseen as well, with particular reference to some areas where noise levels are very high and noise abatement works have to be carried out.

By this way the starting situation is known for taking right decisions in the action plans considering also the perception of affected population and for comparing the data during the last three months of the project by using the same questionnaires. 500-1000 questionnaires are collected. (ref. position paper 2004 of the WG on health and socio economic aspects).

3. The NMPB is the reference model. This action verifies whether some solutions are already adopted by other developed models for improving the use of other data (weather, populations, ground, etc.).

4. According to the national regulations (decree 16/3/98), the measurement campaigns last 1 week for obtaining the A-weighted equivalent continuous noise level for each hour and for 24 hours. By using the obtained data of A-weighted equivalent continuous noise level, for each day, daily and night LAeq is calculated as well as the weekly average levels for the daily and night periods.

In the meantime the meteorological data are collected (temperature and humidity, atmospheric pressure, wind direction and speed).

Frequency spectra are identified for characterising the noise sources.

Finally, for integrating the propagation models, these data are collected:

- territorial data (digital maps) for obtaining a DGM (Digital Ground Model)
- demographic data for evaluating the population exposed to the noise levels
- buildings data
- traffic flows referred to the infrastructures under study
- statistical meteorological data for the implementation of noise propagation models

5. For what concern the innovative solutions for noise abatement, the project verifies which solutions have been already adopted, where and what results have been obtained and what problems occurred.

Action 3 (NOISE MAPS)

Thanks to the data collected during the action 2 and the implementation of the model to be used, noise maps are produced according to the Directive 2002/49/EC and the national D.Lgs. 194/05.

Noise mapping are realised:

- ✓ according to the EC Directive and Recommendation
- ✓ by using the integrated models proposed during the action 2
- ✓ according to the APAT and CTN_AGF paper, "*Indicazioni operative per la costruzione dell'indicatore popolazione esposta*", containing the technical indication to be followed in Italy for this purpose.

For preparing the noise maps, all the partners cooperate for sharing problems met during their work and solutions adopted.

Noise maps are produced also according to the AEN WG position paper "Presenting Noise Mapping Information to the Public". In fact, it's important that maps are clear for people who aren't expert but interested in obtaining information in general or in relation with their specific situation.

For this reason the obtained maps are proposed to the concerned population for obtaining feedbacks related to the maps understanding.

Attention is paid to evaluate the population exposed to noise for obtaining an accurate and transferable methodology for mapping.

The mapping activity will be carried out in each project area. For what concerns the Provinces, two roads are considered. For what concerns the Municipalities a wide urban area is mapped.

Thanks to the mapping activity, the integrated models are validated and their effectiveness is demonstrated.

CIRIAF is in charge for this activity. All the partners are involved for producing their maps. The personnel of Provinces of Genova and Savona directly produced the noise maps of roads. The Municipality of Vicenza and the Municipality of Prato are supported by external experts.

Action 4 (NOISE ACTION PLANS)

Thanks to the data and information collected during the Action 2 and on the basis of the noise maps (action 3), noise action plans (one for each participant local body) are defined according to the requirement set by annex 5 of the D.Lgs.194/05, AEN WG position paper "Presenting Noise Mapping Information to the Public". In each project area, interested parties are involved and "ad hoc" meetings are organized to collect ideas, and feed-backs.

The action plans contain information about the analysed roads and urban areas; the authority in charge; the legal context and the limit values; an evaluation of the estimated number of people exposed by noise from the analysis of noise mapping, identifications of the problems and situations that need to be improved; noise-reduction measures already in force and any future projects; what solutions will be adopted by 5 years (anti-noise barriers, dwellings, asphalts, traffic regulations, speed limits, etc.); when and how they can be realized; their costs and the funding sources; who's in charge; who's involved and which is his role; ex post scenarios for the most interesting interventions.

The City of Prato is the partner in charge.

Action 5 (DEMONSTRATIVE ACTIONS FOR NOISE REDUCTION)

Demonstrative actions are carried out in each project areas. The impact of anti-noise measures was evaluated using additional noise measurements and questionnaires addressed to the interested people (action 7).

Priority is given to actions addressed to sensitive target such as schools as well as the areas where the noise level is particularly high (e.g. > 70dB).

Three categories of activities are taken into consideration:

1. infrastructures for reducing noise (noise barriers, noise reduction asphalts, windows);
2. educational activities related to noise reduction as well as CO₂ emissions reduction;
3. improvement of traffic flows management (speed reduction, traffic reduction).

For what concern the first category, innovative solutions are adopted and adapted to the concerned area and scope:

- replacement of installed windows with new high sound insulating ventilating windows in schools;
- application of one or two stretches of low noise road surfaces (approximate length: from 200 to 500 meters), one of double layer asphalt and/or one of asphalt rubber;
- installation of one or two noise barriers (approximate length: 200 meters, approximate height: 3 meters), one made of recycled materials (recycled plastic, rubber crumb from scrap tires) and/or one made of natural materials (wood, kenaf, flax, etc..).

Characteristics of the abovementioned interventions are indicative in order to estimate costs.

Education activities are based on these demonstration activities and they are addressed especially to secondary and high schools.

Visits are organised for sensitising on the noise problem and to show how it can be solved.

At least three schools are involved (this means about 3000 students for high schools and 1000-1500 for primary schools) for each local body.

Lessons are produced to be transferred to all the schools in the project areas and available to all the Provinces and Municipalities.

The following table provides the scheme of planned works

PARTNER	WORK
PROVGE	High performance Windows for noise absorption (1 high school facade) Innovative noise barriers (450 m ²) Innovative noise absorbing asphalts (3000 m ²)
MUNVI	High performance Windows for noise absorption (1 primary school's facade) Innovative noise barriers (300 m ²) Innovative noise absorbing asphalts (3000 m ² or 500m)
MUNPO	High performance Windows for noise absorption (1 primary school's facade) Innovative noise absorbing asphalts (3000 m ² or 500m) Innovative noise barriers (300 m ²)
PROVSV	High performance Windows for noise absorption (1 high school facade) Innovative noise absorbing asphalts (6000 m ²)

For each kind of activity, sites are selected, infrastructures are designed and ex-ante noise level are measured.

Action 6 (DISSEMINATION)

This action aims at valorising the results during and at the end of the project guaranteeing the exploitation of results also after the project conclusion (not only by the internet site).

The adopted methodology for defining the noise action plans requires that an active communication for involving (not only for informing) the stakeholders and population will be carried out.

Nevertheless the local bodies must guarantee that all the population has access to the noise related information, not only those who participates to the decision process.

Moreover other communication activities are planned for sharing and transferring the results at national and international level.

Four categories of stakeholders are identified:

1. local stakeholders;
2. regional, national and international scientific and technical communities;
3. local bodies in charge for noise mapping and action plans defining;
4. policy makers (EC, Ministry for the environment and Regions)

The dissemination activities start at the beginning of the project being necessary to inform the project target groups and key actors on the project start up and its objectives.

For this reason a project pamphlet is promptly produced and articles are written to be published in newspapers.

With regard to the policy makers (mainly the EC, the Ministry for the environment and regional Authorities), communication activities are carried out aiming at facilitating the transfer of the project best practices to all the European and Italian local bodies in charge for noise reduction.

Recommendations, best practices descriptions are proposed to the EC officers, to the working-groups actually in force and to national and regional policy makers.

Finally, the dissemination activities are:

1. Organisation of the dissemination activities

1.1 Creation of the public relations and communication office at the partner in charge and at each partner for local dissemination

1.2 Production and updating of the dissemination plan. The action leader will produce a first draft which will be a sort of guide line for stimulating new points of view and proposals of the partners. After about 15 days he produces the final version.

2. Dissemination tools

A number of dissemination tools are produced (see the list of key deliverables and outputs below).

3 Dissemination events

3.1 Organisation and realisation of **two workshops** and one dissemination event eventually on the occasion of some other events related to the noise:

- one workshop is organised at the end of the WP2 and at the beginning of the WP3 (when surveys are almost concluded and the mapping is starting - month 9); this is planned in occasion of the annual CIRIAF conference of April 2011.
- one workshop is organised when the maps are ready and the plans are in progress (month 20);
- the dissemination event is planned at the end of the project

In addition, the project contents are discussed during the annual CIRIAF conferences.

4 Local bodies working group

A working group made by local bodies (regions, Provinces and Municipalities) and experts is organised to share results and collect suggestions.

The Province of Genova is in charge for this. The participation of at least 30 local bodies on the average is expected + the participation of experts from regional environmental agencies, professionals, private and public transport companies (e.g. public transport companies, highway companies, etc.).

The WG will meet three times during the project.

5. Communication toward other EU Countries

The project is national. In any case, some actions are foreseen for allowing the dissemination throughout Europe as well.

The internet site will have English pages and relevant dissemination documents will be translated in English as well.

Experts and local bodies representatives will be invited for attending the project events. By this way they will be able to adopt the proposed solutions and transfer them to other local bodies.

Action 7 (MONITORING)

The effectiveness of these infrastructures is demonstrated thanks to the action 7 (Monitoring). As already illustrated, after actions are realised their effectiveness is verified with ad hoc sound level measures and/or with interviews addressed to people affected by noise in the concerned areas.

Measures are made to be comparable with the initial ones.

Action 8 (AFTER LIFE COMMUNICATION PLAN)

• List of key deliverables and outputs

Action 2:

- ✓ Collection of complete data related to noise
- ✓ D1 - "Survey report".
- ✓ Monitoring of ex-ante noise levels in the concerned areas to be compared with noise levels at the end of the project.

Action 3:

- ✓ D2 - Integration of NMPB model
- ✓ production of noise maps (strategic maps of Cities of Vicenza and Prato; maps of roads of Genova and Savona Provinces)
- ✓ D3 - Noise map report explaining methods and results of the noise mapping

Action 4:

- ✓ Realisation of four noise reduction action plans (Cities of Vicenza and Prato; roads of Genova and Savona Provinces)
- ✓ D4 – Noise reduction action plans that describes how action plans have been produced and which are their contents

Action 5

- ✓ 10 demonstrative noise reduction actions:
 - Windows (Cities of Vicenza and Prato; Provinces of Genova and Savona)
 - Asphalts (Cities of Vicenza and Prato; Provinces of Genova and Savona)
 - Noise barriers (City of Vicenza; Province of Genova)).
- ✓ D5 - Report on "Demonstrative action for noise reduction" that describes how interventions have been realised
- ✓ 4 educational demonstrative actions with 3 schools for each project area (12 schools in total – about 10.000 pupils in total)
- ✓ D6 - "Demonstrative actions for noise reduction"
- ✓ D7 - Directory of "Lessons for pupils"

Action 6

- ✓ two workshops in Perugia and in Genova or Prato
- ✓ three national events: 1 in Genova + 2 annual CIRIAF workshops in Perugia
- ✓ the local bodies workgroup
- ✓ the production of dissemination tools: the project pamphlet, the dissemination plan, the NADIA project fact-sheet, the Layman's report, the project brochure, the internet site.
- ✓ articles for local and national newspaper and magazines and for scientific reviews
- ✓ recommendations for national and EU policy makers
- ✓ other local events
- ✓ the project web site

3. Introduction

- Description of background, problem and objectives
 - For LIFE+ Environment Policy and Governance: outline the hypothesis to be demonstrated / verified by the project
 - Description of the technical / methodological solution
 - Expected results and environmental benefits

According to the Directive 2002/49/EC the project aims at contributing to prevent and reduce the environmental noise and its harmful effects.

This environmental problem dramatically affect a large part of the European Union: as reported in the EC Green Paper “Future noise policy” according to the “Burden of Disease of Environmental Noise” of the World Health Organization, one in three individuals is annoyed during the daytime and one in five has disturbed sleep at night because of traffic noise.

According to a progress report on the 5th Action Plan, 11% of the urban population is exposed to a noise level of 70 dB. In most cities noise disturbance in densely built up urban areas exceeds limits and guide values by a wide margin.

Other International, European and national studies confirm the relevance of this problem and its impact on the life quality and health.

Nevertheless, this problem is not adequately tackled by public authorities. Noise emission is strongly related to the CO₂ emissions. In fact the traffic is the main noise source. The adopted solutions can be integrated for facing both problems.

The areas involved in the project are affected by this environmental problem and they are representative for different environmental European situations: urban areas and territories with different density of population and infrastructures are involved.

The project proposes technical solutions to reduce noise levels in specific areas and in short term providing best practices to be adopted by public authorities in charge for noise management and education activities to support noise reduction policies in a long term perspective.

Technical solutions are innovative and concern many possibilities of intervention: noise absorption asphalts, windows and barriers also together with other “standard solutions”, such as roundabouts, for which funding is not requested.

In order to define which are solutions to be adopted and where, the noise reduction action plans are produced involving stakeholders.

Thanks to the project, Provinces of Genova and Savona, were able to complete the mapping and planning work of all roads with more than 3 million vehicles per year.

In the short term a noise level reduction is expected at demonstration sites chosen by project partners and stakeholders. Monitoring actions are foreseen to demonstrate this result.

Lessons are provided at schools and public events are organised to increase the awareness of public to the problem. A relevant participation is expected as well as the raising of interest of schools and students.

- Expected longer term results

In the long term the project partner will adopt solutions according to their noise reduction action plans and many other public bodies will refer to project results to choose solutions to be adopted at their infrastructures/cities areas to reduce noise levels.

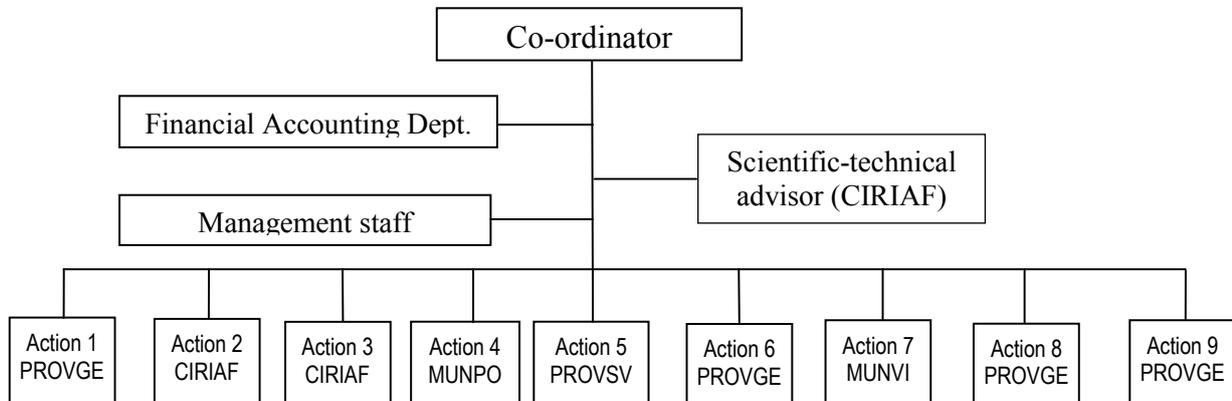
Education tools produced during the project will be used by project partners as well as by other public authorities and education agencies.

The NADIA project will contribute to reduce noise levels in urban areas as well as along main roads.

4. Administrative part

4.1 Description of the management system

The project team is organised according the following organisation chart.



The Province of Genova is the beneficiary. As well as that of Savona (partner), according to national Law, it's in charge for noise mapping of roads with more 3 mio vehicles per year and, consequently, for noise reduction action plans.

Both Provinces have skilled technical internal staff that can operate autonomously to measure, map and manage the environmental noise using recognised tools and procedures.

Partners are the Municipalities of Vicenza and Prato, the Province of Savona and CIRIAF.

Municipalities of Vicenza and Prato, like all European ones (agglomerations) with more 100.000 inhabitants are in charge for noise mapping and noise reduction planning of their urban areas.

CIRIAF (Centro Inter-Universitario di Ricerca sull'Inquinamento e sull'Ambiente) is a is an inter-university research which was founded in 1997. The administrative seat of the Centre is at the University of Perugia. The initial activities of the Centre focused on noise and electromagnetic pollution, but in the years the fields of interest enlarged. In any case, noise pollution is one of the main fields in which the CIRIAF excellence is widely recognised.

The major part of actions is directly coordinated by PROVGE, especially those related to management and communication (1, 6, 8, 9).

CIRIAF has mainly a technical coordination role being the leader of action 2 (surveys) and 3 (noise mapping) and the scientific-technical advisor of project coordinator.

The cities of Vicenza and Prato, as well as the Province of Savona are in charge for the management of one action each one.

Mrs Brescianini is the project manager. She's the manager of technical services in the Province of Genova. Thanks to current and past working positions, she participated in a number of national and European projects (also LIFE projects) having a clear and wide understanding of risks, problem solutions, requirements and opportunities. The coordinator directly manages the partnership and the relationships with the monitoring company Astrale and the EC.

The project coordinator is supported by a dedicate and skilled internal staff.

The financial accounting dept. of the Provincia di Genova will be a part of the management staff.

A steering committee is established in the partnership agreements among PROVGE and each Partner to promptly take decisions with particular reference to quality, meetings time-plan, partnership and changes management.

The steering committee is composed by the Coordinator as representative of Provinces, a representative of Municipalities (MUNVI) and a representative of CIRIAF (as scientific partner).

The Coordinator is supported by the scientific and technical advisor (CIRIAF) to have under control the technical progress of the overall work.

The actions leader manages a specific action. He assures an adequate distribution of tasks and a reviewing process among partners guaranteeing a real cooperation.

Finally, these are the management activities:

1.1 Structuring the management office,

1.2 Organisation of a Kick-off, 4 mid-term and the final management meetings

- The kick-off (the 28-10-2010 in Genova)

- Four progress meetings (Genova – 20 December 2011 in the occasion of the meeting with Astrale EEIG, Vicenza - March 9 2012, Genova - September 27 2012 and October 23 2013).

- The Final meeting (14-15 January 2014 in Genova)

1.3 Changes management:

Main significant modification concerned the partner substitution and project amendment caused by floods occurred in Italy in 2010. The amendment request was sent November 14 2011 and the amended contract with the European Commission was signed March 7, 2012

Other budget insignificant modifications were communicated with reports and they are discussed in the financial section of the final report.

1.4 Payments to the project partners

1.5 Quality control: monitoring of the activities and validation of the project deliverables.

1.6 Production of technical reports and financial statements and reports according to the EC rules. One additional report was sent because of the extension of the project duration:

- First inception report (delivery date: 30/6/11; reporting period 1/10/10 - 30/06/11)
- Mid Term report (delivery date: 6/12/12; reporting period 1/10/10 - 31/10/12)
- Progress report (reporting date: 31-5-2013; reporting period:1/11/12-30/4/13)
- Final report (delivery date: 30/09/14 reporting period:1/10/10-30/6/14)

1.7 Creation of contacts and synergies with other LIFE projects (HUSH, HARMONICA QUADMAP) .

The project management was able to develop very interesting and active synergies with these projects. These projects attended many NADIA events as well as NADIA partners participated in the event organized by the HUSH project in Firenze January 24 2012.

The NADIA project attended a further open meeting of the HUSH and QUADMAP project in 2013.

Project recommendations were shared as well as information on solutions available to reduce noise taking into account other needs such as the usability of noise barriers for children games at school, energy efficiency (windows), etc.

NADIA invited the project HUSH, HARMONICA and QUADMAP to attend the working group sessions and they participated in that organized in Genova.

– Partnership **agreements**:

The partnership agreements were signed by all the partners:

CIRIAF and COMVI: 6/6/2011

PROVSV: 30/6/2011

MUNPO: 12/10/2012 (after the amendment signature and the 2012 budget delayed approval).

The agreements scheme was sent together with the inception report and was received by the EC in 4/7/2011.

All the signed documents are attached to this final report.

After premises on the project and the path of accession of each partner, 19 articles are developed:

Article 1: subject and duration of the agreement. The end of the agreement is the date of final payment made by the Province of Genova.

Article 2 defines roles and obligations of the Province of Genova as coordinator; identification of its financial contribution

Article 3 defines roles and obligations of the partner as associated beneficiary, financial, technical and management issues included; identification of financial contribution of each partner and the distribution of the Community financial contribution

Article 4 defines roles and obligations common to the Province of Genova as coordinator and to the associated partner

Article 5 establishes rules to select suppliers

Art. 6: exemption of EC from liabilities in case accidents etc. occurred during the project;

Art. 7 is related to conflict of interests

Art. 8 concerns obligations of the beneficiaries for technical reporting;
Art. 9 information on European contribution: all the partners commit their selves to disseminate project results and to communicate the EC contribution in all documents, speeches, demonstration sites, etc. ;
Art. 10 confidentiality of information and personal data; project results are public; this article concerns data related to persons or organisations, in the event that data publication could cause harm to the person or to the organisation;
Art. 11 concerns obligations of partners and the beneficiary with regards to financial reports;
Art.12 regulates the responsibilities related to the deliverables production;
Art. 13 and 14 concerns the partners contribution and specifies the scheduling and rules for payments from the Province of Genova to each partner
Art. 15 concerns the final audit of the EC.
Art. 16 underlines that verifications and inspections are possible and cooperation is due
Art. 17 concerns the early termination of the agreement
Art. 18 establishes the steering committee
Art. 19 define the jurisdiction

4.2 Evaluation of the management system

Project management was effective and has been sorely tested by external factors. In particular, it has worked well the relationship between the beneficiary and the external consultant and also the relationship with the monitoring company has proved its value.

The partners have provided the requested information in a timely manner.

Most of the problems occurred before the signing of the partnership and therefore before the establishment of the steering committee. The Province of Genoa has, however, taken steps to inform partners about replacing the Municipality of Padova and the adjustments to the project deadlines. Then it was not necessary to involve the steering committee for special problems.

As already detailed in the inception report, at the beginning of November 2010 the Veneto Region and in particular the cities of Vicenza and Padova was affected by a flood of the Bacchiglione River. A second minor flood affected the same area at the end of December.

After this event, the City of Padova decided to abandon NADIA because of budgetary constraints and uncertainties.

Vicenza took its time to decide but it decided to stay in the project. In April 2011 the person in charge for the Nadia project and its staff was identified and activities started.

In the meantime the Province of Genova supported by partners and its subcontractor sought a new City. In April 2011 the city of Prato confirmed its interest (its staff informally participated in the meeting and dissemination event held in Perugia in the April 8 2011) but it had to wait for budget approval (June 2011) in line with national deadlines.

This project change impacted also on scheduling and a project postponement of the project end was required in the same project amendment.

The amended contract with the European Commission was signed March 7, 2012

The project objectives have been achieved apart small differences that are pointed out in the technical part of the report.

The Province of Genova was also in charge for project dissemination. All the events were held and dissemination tools were produced. The participation was good as well as the interest of other public bodies in charge for noise reduction in noise reduction solutions and in planning process.

The partners involved completed this process using their resources (all provincial roads and the whole cities' territory were mapped and action plans cover them all).

The involved partners are in touch with other project partnership and noise national and European associations. So new projects could be possible even if main Italian Provinces are changing their institutional position becoming "Metropolitan areas" and smaller ones are going to be abolished.

For what concerns Municipalities, both have approved their plan and a budget will be included each year for noise remediation.

5. Technical part (maximum 50 pages)

5.1. Task by task - description

Action 2

At the beginning of the action the M1 report (*Guidelines for surveys*) was produced by CIRIAF as planned.

This document points out which and how data and information have to be collected by the partners for the following noise mapping activities.

According to this document, all the partners appropriately collected the information and data required:



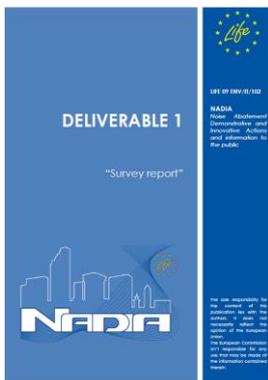
- ✚ Data related to the noise level of infrastructures such as traffic flow and composition (light and heavy vehicles); average vehicles speed; road pavement types; traffic flow characteristics (steady, unsteady, accelerate or decelerate); Digital Ground Model; noise measurements.
- ✚ Data related to the distribution of population from the national official census (census areas).
- ✚ Meteorological conditions (the effect of meteorological conditions have not been considered relevant).
- ✚ Characteristics of the ground.
- ✚ Noise levels.

Because of problems occurred at the beginning of the project, MUNVI and COMPO delayed this action (30/09/11)

Data collected concern the following roads with more 3 million vehicles per year (in the Province of Genova three roads were foreseen).

Managing Authority	Road	Managing authority	Road
PROVSV	SP28 bis	PROVGE	SP35
PROVSV	SP29	PROVGE	SP225
PROVSV	SP334	PROVGE	SP333
PROVGE	SP33	PROVGE	SP523

As pointed out in the Deliverable 1 “Survey report”, the collected data set was adequate for implementing the noise model (M2).



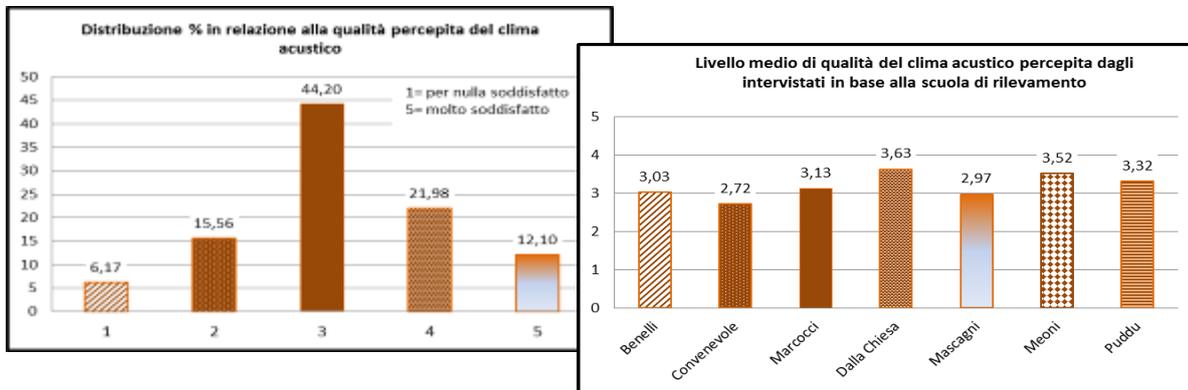
In several areas buildings height was not available in shapefile or in other cartographical format; in these cases the data were estimated through the analysis of satellite images and surveys.

The deliverable includes also the results of an analysis of the state of the art of innovative noise barriers that integrated acoustic performances with other aspects such as energy performances (integration with photovoltaic), use of natural or recycled materials, enjoyment by children (when applied to a school).

In addition to this deterministic approach, **data on noise annoyance have been collected** in some specific urban areas where demonstrative actions would have been realised. About 500 people in each project area have been interviewed before and after the noise reduction actions using a survey a

proposed by MUNVI related to noise perception in critical areas. The survey was created using the outcomes of previous experiences of CIRIAF in the field of soundscape research¹

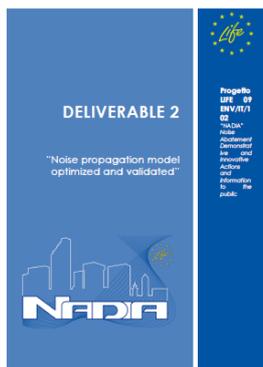
Two examples of graphs elaborated in the reports are reported here below



Action 3

Model optimisation

Thanks to data collected in action 2, the noise propagation model was implemented.



The noise propagation model used within NADIA project was, as stated by European Directive 2002/49/EC also called END, the NMPB-Routes-96.

The Deliverable 2 illustrates the standard methodology to organize the input data using GIS (Geographic information System) files.

All the input data should be given in a GIS format (or shapefile, file extension .shp and related), in order to analyse and verify them even through open source software. Shapefiles can be easily imported in noise simulation software.

The Deliverable 2 defines also a standard identity code for the shapefiles name and for their attributes. This procedure aims at performing noise simulation activities in a fast, accurate and efficient way.

The methodologies developed in NADIA project and reported in the Deliverable 2 can be easily adopted in other road noise mapping activities using the NMPB-Routes-96

The index of the Deliverable is as follows:

- 1 Introduction
- 2 Roads mapped within NADIA Project
- 3 Collecting data

¹ G. Brambilla, V. Gallo, F. Asdrubali, F. D'Alessandro "The perceived quality of soundscape in three urban parks in Rome", The Journal of the Acoustical Society of America 07/2013; 134(1):832-9; ISSN: 0001-4966.

4 Data input collection and analysis model: Agglomerations

- 4.1 Calculation area
- 4.2 Traffic flow
- 4.3 DGM data
- 4.4 Ground Factor
- 4.5 Noise barriers
- 4.6 Building (usage, height, floor, population)
- 4.7 Meteorological data

5 Data input collect and analyse model: Major road

- 5.1 Calculation area
- 5.2 Traffic flow
- 5.3 DGM data
- 5.4 Ground Factor
- 5.5 Noise barriers
- 5.6 Building (Usage, Height, Floor, Population)
- 5.7 Meteorological data

6 List of shape-file

- 6.1 Agglomeration
- 6.2 Major road

References

Model validation and noise mapping

Using the optimised model noise strategic maps have been done for the Provinces of Genova and Savona and Cities of Vicenza and Prato

For each road five maps were produced:

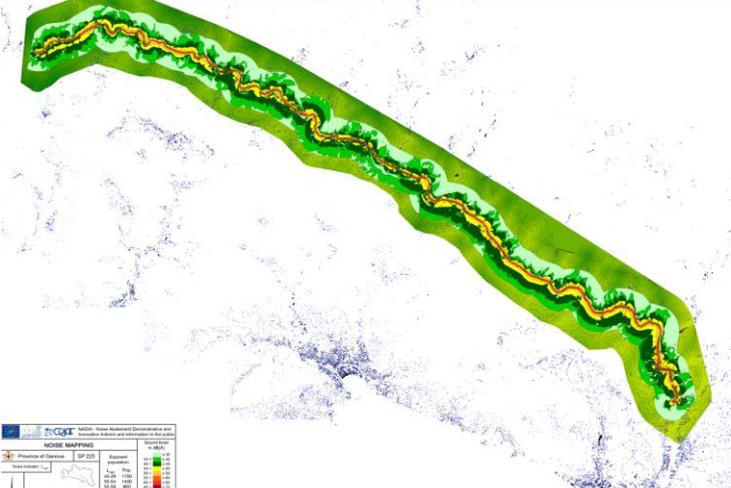
- Two showing the noise contours with the same level in dB(A) respectively for the indicators L_{den} and L_{night} , combined with the DGM;
- Two showing the noise contours with the same level in dB(A) respectively for the indicators L_{den} and L_{night} , combined with satellite images;
- One showing the noise contours of 55 and 65 dB(A) of L_{den} .

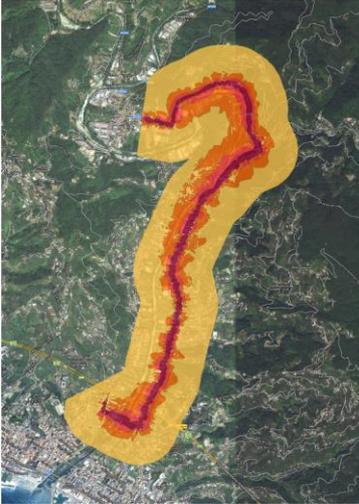
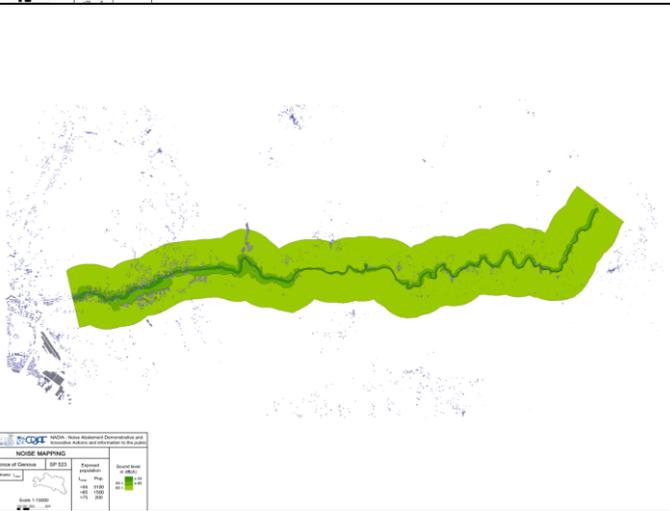
Province of Genova

Five roads were mapped with the NADIA resources (instead of 3) and, as expected, the internal staff has seized the opportunity to complete the work. So all provincial road were mapped using internal resources.

The roads concerned by the NADIA project are: **SP35, SP225, SP333, SP523, SP33.**

Here below you can find some maps related to them.

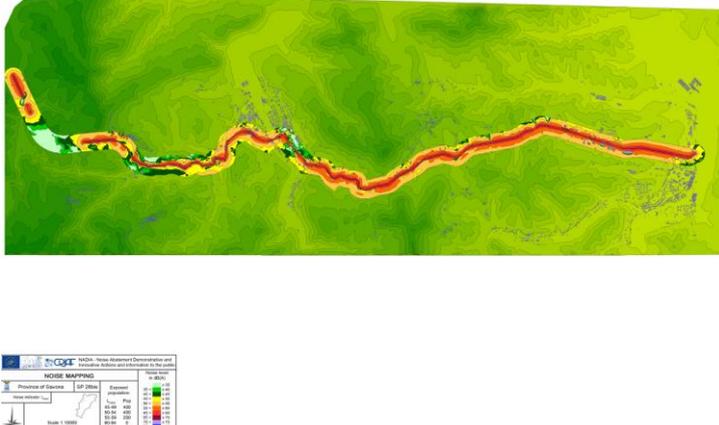
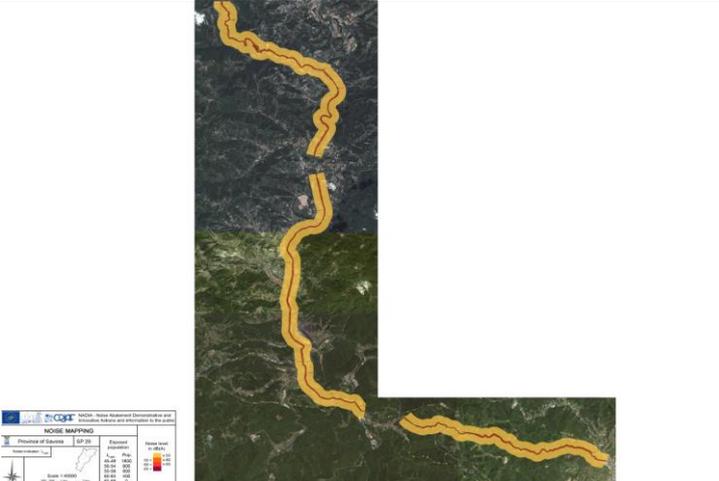
Road N.	Map	Indicator
35	 A vertical map showing a road (SP35) with noise contours. The road is highlighted in orange and yellow, surrounded by green and light green areas representing noise levels. The map is overlaid on a Digital Ground Model (DGM) showing terrain elevation. A legend in the bottom left corner indicates noise levels in dB(A).	Lden on DGM map
225	 A diagonal map showing a road (SP225) with noise contours. The road is highlighted in orange and yellow, surrounded by green and light green areas representing noise levels. The map is overlaid on a Digital Ground Model (DGM) showing terrain elevation. A legend in the bottom left corner indicates noise levels in dB(A).	Lnight on DGM map

33		Lden on satellite image
333		Lnight on satellite image
523		Contours of 55 and 65 dB(A) of Lden.

Province of Savona

As foreseen, three roads were mapped with the NADIA resources and, as expected, the internal staff has seized the opportunity to complete the work. So all provincial road were mapped using internal resources.

The roads concerned by the NADIA project are: **SP28 bis, SP29, SP334.**

Road	Map	Contents
28b		Lden on DGM map
29		Lnight on satellite image
334		Contours of 55 and 65 dB(A) of L_{den} .

For all provincial roads data have been analysed. Tables and graphs have been produced and discussed like the following ones:

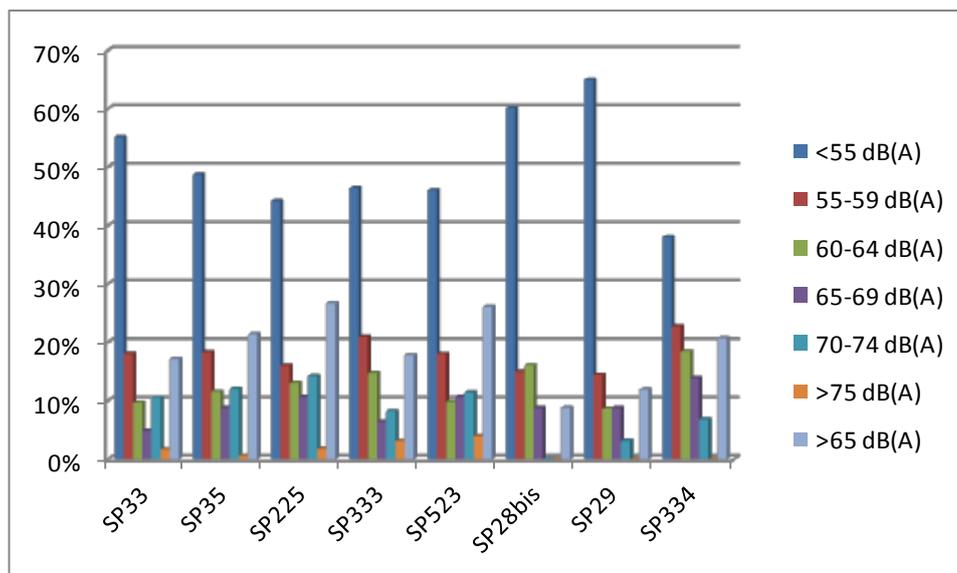
Population exposed to noise (L_n)

Bands of value in L_n	Number of people exposed to noise							
	SP33	SP35	SP225	SP333	SP523	SP28b	SP29	SP334
45-49	2400	2500	1700	2700	1100	400	1800	500
50-55	1300	1400	1400	1900	600	300	800	500
55-59	600	1100	900	800	700	400	800	500
60-64	1300	1600	1400	1000	700	100	400	300
65-69	200	100	200	400	200	0	0	0
>70	0	0	0	0	0	0	0	0

Number of people living in buildings having a quiet façade (NPQ)

Road	Managed by	NPQ	%	Road	Managed by	NPQ	%
SP33	PROVGE	1300	10	SP28b	PROVSV	400	18
SP35	PROVGE	1600	13	SP29	PROVSV	700	8
SP225	PROVGE	1800	19	SP334	PROVSV	500	19
SP333	PROVGE	3100	26				
SP523	PROVGE	800	13				

Percentage of people exposed to L_{den} noise classes



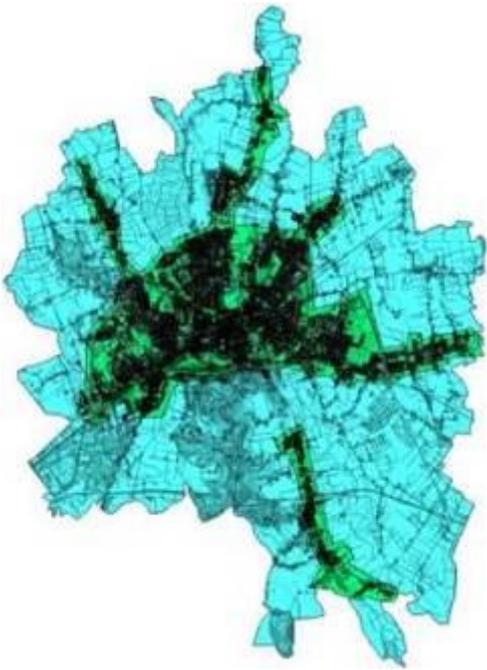
City of Vicenza

The agglomerate of Vicenza matches with the administrative boundaries of the municipality of Vicenza. The city area is affected by the noise emission of:

- Municipal road network;
- Controlled-access highways A4 and A31;
- Other road networks;
- Rail networks.

The strategic noise map of the agglomerate of Vicenza was produced considering the noise emission of the roads within the urban area of the municipality of Vicenza

In green the urban area mapped during NADIA Project,. In cyan the whole area managed by the Municipality of Vicenza.



Noise maps related to Lden and Lnight have been produced.

Lden



Lnight



The people exposed to noise have been calculated, considering respectively indicators L_{den} and L_{night} .

Values of population exposed to noise (L_{den})

Class L_{den}	Population exposed	
	N° of inhabitants	Percentage (%)
<55	31.900	31,9
55-59	19.500	19,5
60-64	15.800	15,8
65-69	18.900	18,9
70-74	12.000	12,0
>75	2.000	2,0

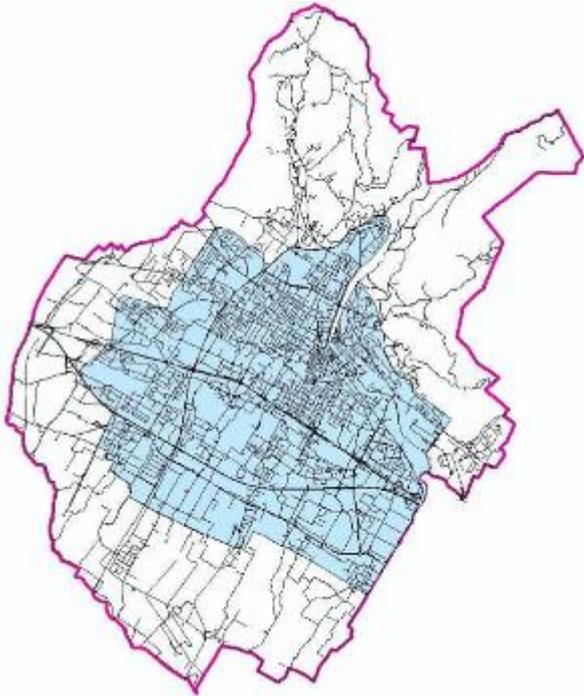
Values of population exposed to noise (L_n)

Class L_{night}	Population exposed	
	N° of inhabitants	Percentage (%)
<50	46.300	46,3
50-55	15.800	15,8
55-59	18.300	18,3
60-64	15.300	15,3
65-69	3.800	3,8
>70	500	0,5

City of Prato

The agglomerate of Prato matches with the administrative boundaries of the municipality of Prato. The city area is affected by the noise emission of:

- Municipal road network;
- Controlled-access highways A11;
- Other road networks;
- Rail networks.

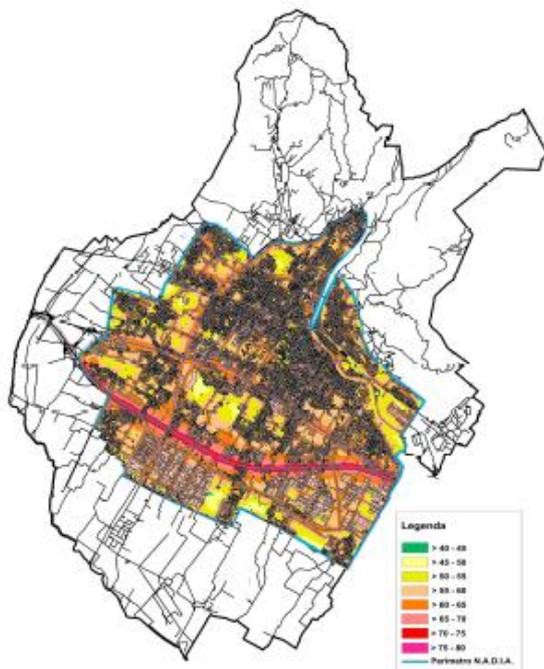


The strategic noise map of the agglomerate of Prato was produced considering the noise emission of the roads within the urban area of the municipality of Prato.

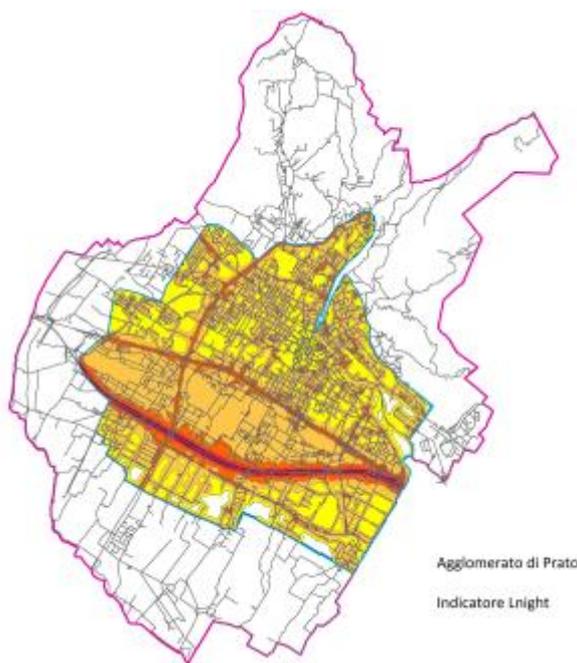
In cyan the urban area studied within NADIA Project. The magenta line is the administrative border of the Municipality of Prato

Noise maps related to Lden and Lnight have been produced.

Lden



Lnight



Agglomerato di Prato
Indicatore Lnight

The people exposed to noise have been calculated, considering respectively indicators L_{den} and L_{night} .

Population exposed to noise (L_{den})

Class L_{den}	Population exposed	
	N° of residents	Percentage (%)
<55	12.600	8,0
55-59	14.400	9,1
60-64	61.900	39,2
65-69	67.400	42,7
70-74	1.500	0,9
>75	100	0,1

Population exposed to noise (L_n)

Class L_{night}	Population exposed	
	N° of residents	Percentage (%)
<50	22.100	14,0
50-55	41.900	26,6
55-59	88.200	56,0
60-64	5.300	3,4
65-69	100	0,1
>70	0	0,0

More methodological details and results are available in Deliverable 3.

All maps are available in the internet site.

Action 4

Action 4 consists in noise reduction action plans redaction and approval.

All action plans have been produced involving stakeholders and approved by Councils:

- Province of Genova, July 9 2013
- Province of Savona, March 27 2014
- Municipality of Vicenza, June 24 2014
- Municipality of Prato, April 3 2014

The realization of the Noise Action Plans has been guided by the Italian Technical report UNI/TR 11327:2009.

The NADIA project considers five roads managed by the Province of Genova (S.P. 33, 35, 225, 333, 523), three by the Province of Savona (S.P. 28bis, 29, 334) and part of agglomerations of Vicenza and Prato

Areas requiring noise abatement measures (critical areas) are identified comparing the results of noise propagation simulations with the noise limits defined by municipalities in their territory according to the national laws.

Noise abatement actions are needed where the estimated sound pressure values are higher than the limits.

For this purpose, new noise simulations have been carried out in accordance with the Italian legal framework. This operation was necessary to calculate the “Priority index” according to the Italian DM 29/11/2000 since it requires noise levels in day-time (from 06 to 22) and night time (from 22 to 06) at receivers located at a distance of 1 m from each building façade instead of L_{den} and L_{night} at receivers located on the façade as required by the END directive.

In order to identify which measure was technically feasible in each critical area, a classification of critical areas was done:

- Urban area as defined by the Italian traffic Laws;
- Rural area: small group of buildings that cannot be identified as an Urban area;
- Special Buildings: hospital, nursing homes, schools and kindergartens

Special buildings have been identified and evaluated separately from the others. An offset of 50m has been done for each critical building perimeter

A priority index has been calculated for each critical area and special buildings in order to determine where the noise abatement measures are more urgent.

This is an example from the action plan of Provincia di Genova of the top five priorities in 96 according to the “Index of priority”

IP RANK	Critical area or special Building (in parentheses the critical area where the building is)	Index of Priority (IP)	Road
1	Scuola Media Superiore ITIS Primo Levi (Busalla)	31576	SP35
2	Casarza Ligure	12370	SP523
3	Scuola Elementare e Statale “Edmondo de Amicis” (Ronco Scrivia)	11880	SP35
4	Scuole Primarie e Secondarie (Mignanego)	11562	SP35
5	Uscio	11025	SP333

For each critical area or special building, proper solutions had to be adopted.

Solutions analysed from the technical point of view are:

- High insulating windows
- Low-noise road pavement
- Noise barriers
- Creation of cycle lanes
- Reduction of vehicles speed
- New road infrastructure

Prices have been collected from the price lists used by the Administrations for public works while noise abatements of the solutions have been taken from the experiences of previous EU funded projects (mainly SILENCE).

The following tables have been produced to resume the data collected

Name	Abatement dB(A)	Cost	note	Urbanized area	Rural areas	Special buildings
Installation of high sound insulating windows in each critical building <u>façade</u> in which the noise limits are exceeded;	Complete rehabilitation	550 €/m ²		X	X	X
Installation of high sound insulating windows in each critical building <u>façade</u> in which the noise limits are exceeded by more than 5 dB(A);	Complete rehabilitation	550 €/m ²		X	X	
Installation of high sound insulating windows in each critical building <u>façade</u> in which the noise limits are exceeded by more than 10 dB(A);	Complete rehabilitation	550 €/m ²		X	X	
Installation of high sound insulating ventilating windows in each critical building <u>façade</u> in which noise exceeds limits;	Complete rehabilitation	750 €/m ²	The presence of fans integrated in the frame guarantees the correct air change rate in the room	X	X	X
Installation of high sound insulating ventilating windows in each critical building <u>façade</u> in which noise exceeds limits by more than 5 dB(A);	Complete rehabilitation	750 €/m ²		X	X	X
Installation of high sound insulating ventilating windows in each critical building <u>façade</u> in which noise exceeds limits by more than 10 dB(A);	Complete rehabilitation	750 €/m ²		X	X	X
Laying of low-noise road surfaces	3	15,1 €/m ² + 0,5 €/m		X	X	X
Installation of noise barriers	10	300 €/m ²	-		X	X
Creation of cycle lanes	1.5	100 €/m	-	X		
Reduction of vehicles speed	2	3.000€/device	2 devices/500m, but 4 at least.	X	X	
New road infrastructure (bypass)	6	10000 €/m	Considering a reduction in traffic volume of 75%	X		

Further details are available in Deliverable 4.

A procedure for the cost-benefit analysis was developed to:

- *Identify the most efficient noise measure for each critical area:* the cost-benefit analysis aims to identify which is the most suitable noise reduction measure that solve the noise limit exceed in a critical area taking into account not only economic parameters;
- *Establish an innovative index of priority for the realization of noise reduction measures:* an innovative ranking based on the results of the cost-benefit analysis was prepared.

The ranking based on the index of priority (IP) is useful to determinate in which areas the acoustic environment is most critical.

The ranking based on the cost-benefit analysis (CBI) is useful to optimize the budget available for the managing authority for the acoustic rehabilitation. If for the i-th area/special building the noise measure A has the same cost of B, the most efficient noise measure in terms of IP reduction will be preferred.

The cost-benefit ranking considers also the noise reduction measures that don't rehabilitate completely the critical area.

Combined noise reduction measures were taken into account too; the following combinations have been considered:

- Noise barrier and low noise asphalt;
- Noise barrier and reduction of vehicle speed;
- Low noise asphalt and cycle lanes;
- Low noise asphalt and reduction of vehicle speed.

For each critical area the cost-benefit indicator (CBI) for the technically feasible noise abatement measures was calculated using the following equation:

$$CBI = \frac{\text{cost of the measure [€]}}{(IP_{\text{before the measure}} - IP_{\text{after the measure}}) * k}$$

K is a penalization coefficient introduced in the calculation of the benefits: its value is 0.5 for normal windows and 0.75 for auto-ventilating windows.

According to this procedure, tables like the following one are included in action plans (some lines are deleted in this report to be short):

<i>Evaluation of the CBI for different anti-noise measures in the "Savona Nord" critical area</i>			
<i>Anti-noise measure</i>	<i>IP reduction</i>	<i>Cost [€]</i>	<i>CBI</i>
<i>Installation of high insulating windows in each critical building façade in which the noise limits are exceeded;</i>	1308	750.750	1.148
<i>Installation of high insulating and ventilating windows in each critical building façade in which the noise limits are exceeded;</i>	1308	1.023.750	1.043
<i>Installation of high insulating and ventilating windows in each critical building façade in which the noise limits are exceeded by 5 dB(A);</i>	1284	599.625	622
<i>Installation of high insulating and ventilating windows in each critical building façade in which the noise limits are exceeded by 10 dB(A);</i>	445	320.288	958
<i>Low-Noise asphalt</i>	458	46.172	101
<i>Reduction of vehicle speed</i>	309	12.000	39
<i>Low-Noise asphalt and creation of cycle lane</i>	678	249.572	368
<i>Low-Noise asphalt and reduction of vehicle speed</i>	750	58.172	78

* NA: not applicable (in this case noise barriers cannot be installed in urbanized areas)

Of course the measures that have the lowest values of CBI are to be preferred.

The noise reduction measure for the roads managed by the Province of Genova and Savona are reported respectively in the Annex 4 and 5 of the Deliverable 4. Those adopted by Cities of Vicenza and Prato are described respectively in the Annex 6 and 7 of deliverable 4.

Action 5

The outcomes of the Noise Action Plan were used to select the areas with the highest priority for a noise reduction action, with a special focus on hospitals, schools and similar noise-sensitive buildings. Once the sites were selected, noise measures and surveys were performed to collect data about the ante-operam scenario.

The planned demonstrators were realized by the end of the project. Only the Province of Savona increased the asphalted surface instead of installing noise reduction windows. In fact they didn't find schools that needed them. In particular:

1 Province of Genova

- Installation of high insulating windows (weighted sound reduction index $R_w = 46$ dB, thermal transmittance $U_{g,} = 1,1$ W/m²K) at the nursery school "La carica dei 101" in Ronco Scrivia, along S.P.35;
- Installation of a noise barrier to protect the green areas of the nursery school "La carica dei 101" in Ronco Scrivia, along S.P.35. The barrier, 41 m long and 2,5 m high, allows a reduction of the Leq,A around 10 dB(A) and is made of wood and transparent materials;
- Realization of two low noise pavement surfaces along SP 225 (825 m²) and along SP333 (1080 m²).

2. Province of Savona

- Realization of two low noise pavement surfaces along SP 334 (5000 m²) and along SP29 (4000 m²).

3. Municipality of Vicenza

- Substitution of all the windows of the primary school "Ca' bianca" in Vicenza with more insulating ones;
- Realization of a low noise pavement surface nearby the primary school "Ca'bianca" (4200 m²).
- Installation of high insulating windows in one façade of the primary school "Lattes" in Vicenza (the Municipality used its economic resources);
- Installation of a noise barrier to protect the primary school "Lattes" in Vicenza. The barrier, 62 m long and 4,3 m high, is made of wood and concrete. The surface of the noise barrier is flat and easily cleanable so the pupils can draw on it.

4. Municipality of Prato

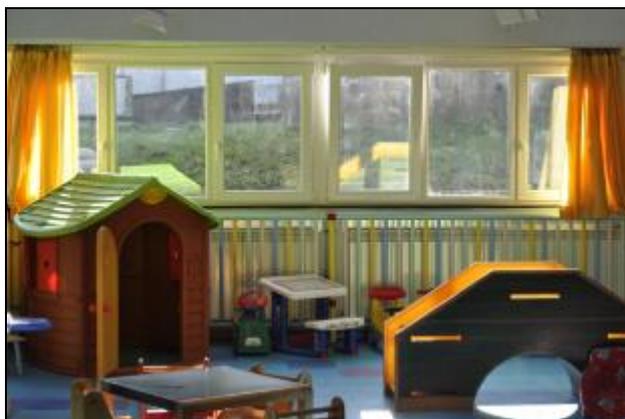
- Installation of high insulating windows in one façade of the primary school "Meoni" in Prato with more insulating ones. The action allowed to increase the façade sound insulation from 22 dB to 42 dB.;
- Realization of a low noise pavement surface nearby the primary school "Meoni" (8500 m²).

Demonstrative actions for noise reduction realised by Province of Genova

Noise absorption asphalt



Noise insulating windows at “La carica dei 101” school



Noise barrier at “La carica dei 101” school



Demonstrative actions for noise reduction realised by Province of Savona



Road n. 334 (Municipality of Stella San Giovanni): noise absorption asphalt



Road n. 29 (Municipality of Quiliano): noise absorption asphalt

Demonstrative actions for noise reduction realised by City of Vicenza



Noise insulating windows at “Ca’ Bianca” primary school



Notice boards concerning noise asphaltting and windows positioning at Ca’ Bianca school

Noise absorption asphalt positioned at Ca’ Bianca school



**ABBIATE PAZIENZA, NE VARRÀ LA PENALITÀ!
VICENZA SI FA BELLA**

INSTALLAZIONE NUOVE BARRIERE ANTRUMORE PRESSO LA SCUOLA MATERNA "L. LATTES"

Numero contrattuale: **€ 64.857,00 + I.P.T.A. € 2.820,00**
 d'adempimento per il Piano di Manutenzione
 Autorizzabile: **determina P.G.N. 58927 del 06/08/2012**
 Responsabile del Procedimento e Progettista: **Ing. Diego Galluzzo**
 Direttore dei Lavori: **Ing. Marco Dal Corralo**
 Coordinatore Tecnico: **Ing. Marco Dal Corralo**
 Impresa esecutrice: **ROSE COSTRUZIONI GENERALI S.p.A.**
 Direzione Tecnica di cantiere: **Ing. Marco Dal Corralo**
 Data consegna lavori: **30 giugno 2012**

COMUNE DI VICENZA
 SETTORE GESTIONE TERRITORIO, URBANISMO, AMBIENTE, S.P.A.

Progetto cofinanziato dalla Commissione Europea nell'ambito del progetto Lillio 00 53NVT7000902 "NADSA"

Noise barriers positioning at “Lattes” primary school



Noise barriers positioned at "Lattes" primary school

Demonstrative actions for noise reduction realised by City of Prato

Noise absorption asphalt positioning



Existing windows



New windows

For each demonstrative site ex ante noise measures have been done and stakeholders have been met even if with different approaches and timing (ex post measures are part of action 7).

In Vicenza, sites were already well known as critical:

- Via “Quadri”, were “Lattes” schools is, has 21000 vehicles per day.
- Strada Pasubio accounts 26.000 vehicles per day.

Local committees were already met also before the project and questionnaires distribution were very useful to receive additional input from them and from citizens.

The Province of Genova opened the decisional process to define which are the best solutions concerning the visual insertion, the usability of the acoustic barrier and other similar aspects. Two meeting were held during 2013 at the premises of the Municipality of Ronco Scrivia.

Education activities

Education activities have been realised according to the project contents.

From 2011 to 2013, the **Province of Genova** involved 2 schools in its territory and participated in meeting organised by the Province of Savona at one school. They are:

1. the Scientific and technologic high school “Primo Levi” in Ronco Scrivia Municipality where lessons have been held;
2. the “Villaggio del ragazzo” in Cogorno that supported the questionnaires distribution and collection

In Primo Levi high school 6 classrooms were involved and 2 lectures were carried out each. The first lecture concerned the NADIA project, the sound, the variables and parameters influencing it, the noise measurement;

The second meeting focused on the following topics:

- outline the techniques for the measurement of sound phenomena;
- presentation of main noise pollution sources and related techniques for noise reducing;
- use of sound-level meters by the students.

The measures proposed to the students concerned: the "silence" (in class and in a wooded area close to the school), the speech, the noise from outside the classroom with the window closed and open, the headphones for listening music, the traffic and students' motorcycle, natural sound sources present in the area (i.e. a stream, birds).

The use of sound level meters has aroused interest and curiosity. The boys have proposed additional measures: the sound of the bell, the voices during recreation, beverage vending machine, premises of the gym during a lesson of volleyball.

The Province of Genova added education activities taking profit from a international education event organized in Genova each year: the “Science festival”.

This event lasts 10 days and involves researchers, private companies, etc.

In particular in 2013 the Province of Genova met hundreds of students visiting its stand and 284 students participated in “Noise laboratory” organized during the festival (**14 schools** and 31 teachers).



Plenary training sessions at school

The Province of Genova cooperated also with the Province of Savona at the surveyors high school “Patetta” in Cairo Montenotte Municipality

Province of Savona provided lessons to the surveyors high school “Patetta” in Cairo Montenotte Municipality.

At this school, meetings with 4 classrooms have been held during 2013 and 2014 school year. Two lessons were addressed to each class. The first one covered the following contents:

- illustration of the project NADIA;
- what is the sound;
- what are the variables and parameters of acoustic phenomena;
- what is the sound and how it is identified;
- main techniques of reduction of road noise;
- read noise maps.

The second meeting focused on the following topics:

- measurement techniques of acoustic phenomena;
- uncertainty of the measurements;
- use of sound level meters by students.

Cooperating with the Province of Genova, visits to demonstration sited were organised at “La carica dei 101” nursery school.

The **city of Prato**, in 2013/2014 school-year exploited the works done at Meoni primary school for sensitising its children.

Training on acoustic at primary school



In primary school “Meoni” a lecture was held for the students of the fourth and fifth classes, set in three distinct phases:

- 1 brief introduction on acoustics, edited by a technician of the company that designed of the intervention for noise abatement at Meoni school;
- 2 presentation of the NADIA project and projects for noise abatement;
- 3 a time of discussion with the children.

The following topics were covered in the first part: what are noise and sound, main parameters that characterize the sound (intensity and frequency), logarithmic scale in an understandable way to children; listening to sounds that differ in the doubling of the source and the observation that this leads to an increase of 3 dBA.

The **City of Vicenza** finalised training activities with two high schools and education activities with primary schools were noise reduction works have been done. Two high schools are the technical industrial institute “A. Rossi” (school year 2012-13) and the surveyors institute “Canova” (school year 2013-14).

The regional environmental agency (ARPAV) and regional health organisation (ASL) cooperated in training activities.

In ITIS Rossi, 100 students (belonging to the second, third and fourth classes in five) participated in two lectures..

The first meeting was informative and the second deepened some of the topics covered.

The theme of environmental noise was presented from three points of view:

administrative, with a speech by an official of the Municipality of Vicenza;

technician, two talks by officials of ARPA Veneto;

health, with a speech by an official of Local Health / SPISAL.

The topics covered are listed below:

- noise pollution and regulations;
- functions performed by the City, State, and Local Health ARPA;
- presentation of an acoustic classification of the municipality of Vicenza;
- complaints of citizens and the responses of the Public Administration;



Technical training at high school

- elements of physical acoustics and noise propagation;
- sound measurements;
- the acoustics in the building: design of facilities and structures;
- the effects of noise on health;
- audiometry, socio-acusia, presbycusis, noise-induced hearing loss;
- acoustic protection.

At Canova surveyors Institute, III, IV and V classes were involved. In total 100 students participated in two lectures.

Contents were similar to the ITIS Rossi’s ones (see above). More attention was paid on relationships between noise and buildings

Action 6 (see 5.4.1 and 5.4.2)

Action 7 (see 5.2)

Action 8 (see 5.4.3)

5.2 Evaluation

Methodology applied

The NADIA project was based on a typical methodological approach for environmental noise management:

- noise mapping (analytical phase),
- noise reduction planning (planning phase),
- noise reduction action (do),
- noise reduction monitoring (check),
- noise management review (after the end of the project).

The chosen approach allowed defining and scheduling properly the activities during the life of the project in order to avoid delays and ensure an overall good quality of the outcomes.

One of the main goal was to involve students in studying the effects of noise on people's health and wellbeing in order to increase their awareness on this topic. During the meetings and the lessons organized by the partners the interest and the participation of youngsters was beyond expectation.

However several problems were encountered during the organization of the lessons at school because of the lack of cooperation with schools and teachers and of the complexity of the Italian school system.

As a result the involvement of schools was very difficult and, from the point of view of quantity, the results were below expectations.

A suggestion for those willing to propose future projects on this topic is to involve schools since the beginning of the project, by means of proper participation as partners or just with a letter of interest.

In order to tackle this problem the Province of Genova applied an alternative approach too, giving public and open lessons on environmental noise during the Festival of Science that takes place every year in Genova and attracts thousands of people, particularly students from the schools of the Liguria region. This approach allowed to easily sharing the results of the project to a wider audience.

Results

Quantitative values related to noise reduction in the demonstration sites were collected during **action 7 “Monitoring”**.

During this action, each partner performed (or subcontracted) post-operam noise measurements to verify the effects of the demonstrators realized by the partners.

The evaluation of the impact of demonstrators on peoples' perception (qualitative assessment) was also assessed by means of questionnaires.

Results obtained during the project are reported in the following table

Detailed results are reported in Deliverable 5.

Task	Foreseen in the revised proposal	Achieved	Evaluation
2	Guidelines for survey (M1)	YES	
2	Data collection	YES	M2 was satisfied; only buildings height was not available in GIS or in other format and measures have been done to obtain this data
2	Survey report (D1)	YES	It was produced without problems
2	State of the art of anti-noise actions for noise reduction	YES	“
2	Analysis of road noise propagation models	YES	“
2	Integration of model proposal	YES	“
3	Noise propagation model optimised (D2)	YES	No problems occurred. It includes instructions for users.
3	Noise maps	YES	The work was carried out carefully by each partner, which sent maps to the authorities in charge. All the partners seized the opportunity to complete the work for all roads and agglomerations using their own resources.”
3	Noise map report (D3)	YES	Target successfully achieved even though the change of the original scheduling due to the flood events and the substitution of a partner (CIRIAF had to wait the end of mapping of MUNVI and MUNPO)
4	Stakeholders participation	YES	<p>The stakeholder’s participation has been obtained by all the partners. Although the efforts done, participation was a little bit lower than expected but qualified. Few citizens attended meetings whilst municipalities and professionals were very interested. 20 participants were expected in each area.</p> <p>PROVGE organised 4 meetings and 1 round table obtaining the participation of 18 Municipalities plus professionals and some citizens (300 people invited)</p> <p>PROVSV invited all the Municipalities involved in the noise plan. Only 4 participated in the meeting organised to discuss the plan proposal. In total 20 people participated in the participation process</p> <p>MUNVI organised more meetings during the project to involve technicians, citizens and interested parties and they discussed also about solutions to be included in the plan. For the meeting specifically organised to discuss the plan, MUNVI obtained the participation of 15 stakeholders on 70 invitations.</p> <p>MUNPO obtained the participation of 10 interested organisations that participated in the action plan draft presentation held September 30 2013.</p> <p>The local engineers’ organisation presented written considerations.</p> <p>All the partners presented their maps and action</p>

			plans allowing stakeholders to give their feedbacks on line.
4	D4 “Action plans directory”	YES	Target successfully achieved even though the change of the original scheduling due to the flood events and the substitution of a partner (CIRIAF had to wait the end of action plans of MUNVI and MUNPO)
5	Adhesion of 12 schools (M4)	YES	The DIRECT participation of 9 schools was obtained. As wrote in Action 5 activities description it was very difficult to have ongoing stable relationships. For this reason Province of Genova sized the opportunity of the “Science Festival” to meet 14 additional schools. Results were very good also from the qualitative point of view.
5	Authorisations for all demonstrative actions M5	YES	Authorisation was not a problem because it was an internal process. In some cases it was not necessary.
5	Windows and barriers providers identified (M6)	YES	Calls for tenders were published and providers selected
5	Asphalts completed (M7)	YES	23.600 square meters of roads were covered with low-noise asphalt instead of 12.000 square meters foreseen in the project. PROVSV installed 9.000 m2 of low-noise pavement on two roads instead of 6.000 m2 on one road: it was necessary also because PROVSV could not find schools needing the substitution of windows and asphalts were the only solutions to reduce noise in the selected sites. MUNPO distributed a 5.500 s.m. more than planned MUNVI distributed a 1.200 s.m. more than planned PROVGE distributed - 1.000 s.m. less than planned
5	Windows and barriers are ready to be installed (M8)	YES	No problems occurred
5	Windows and barriers are positioned (M9)	YES	PROVGE, MUNVI and MUNPO positioned windows on one school’s façade each as foreseen. PROVSV didn’t find a school that was interested along the roads affected by traffic because they had already installed new windows. Noise absorption asphalts were the only solution to be adopted in selected sites. PROVGE and MUNVI installed noise barriers. On the basis of actual needs and site characteristics, the total size of barriers was smaller than foreseen (MUNVI 265 square meters and PROVGE 102 s.m.) but the result has been achieved.
5	D5 (demonstrative actions for noise reduction – report)	YES	It was produced without problems
5	D6 – Lessons for pupils	YES	It was produced without problems
7	Effectiveness of the action Action 7 - monitoring	YES	The action effectiveness is discussed in D5 together with works description. In this way, reading and understanding are facilitated. Asphalts reduced noise differently. Good results in urban areas (- 3 dB); less benefits in mountain roads (from 0 to – 2 dB) according to slope and tortuosity

			<p>Reduction obtained with noise barriers varies from -8 dB (MUNVI) to -9,6 (PROVGE)</p> <p>Windows obtained the best result (-20dB)</p> <p>Results obtained are in line with what expected on the average: the worst results with asphalts; the best ones with windows.</p> <p>Qualitative results were very good. Interviewed people declared that the benefit was high or very high (84% in total). The opinion about the noise barriers design was very good (95%).</p> <p>MUNVI founds that the positive perception of noise climate rose from about 21% to about 45%.</p> <p>MUNPO interviews showed that satisfied people increased from 81% to 92%.</p>
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5.3 Analysis of long-term benefits

1. Environmental benefits

a. Direct / quantitative environmental benefits:

The project allowed reducing noise with reference to critical buildings.

The main source of environmental noise is the traffic and the project didn't aim at reducing traffic or changing the traffic characteristics.

The environmental noise declined by some dB thanks to the laying of asphalts.

The project allowed to reduce the noise level in protected environment such as square and gardens of schools thanks to noise barriers (-8 and 9,6 dB) and classrooms (less 20 dB).

b. Relevance for environmentally significant issues or policy areas

According to the Directive 2002/49/EC the project aims at contributing to avoid, prevent and reduce the environmental noise and its harmful effects.

This environmental problem dramatically affects a large part of the European Union. The EC in 1996 the EC adopted the Green Paper "Future noise policy". This document put in evidence that at least the 20% of the EU population suffer from noise levels. Starting from this document, noise has had been including in EC environmental policies.

According to a progress report on the 5th Action Plan, 11% of the urban population is exposed to a noise level of 70 dB. In most cities noise disturbance in densely built up urban areas exceeds limits and guide values by a wide margin. At the same time subjective nuisance from noise is increasing.

According to this report and other reports, documents, statistics, etc., the relevance of noise was confirmed also in 6 EAP being a critical issue for the URBAN ENVIRONMENT.

Consequently the noise is also included in the urban strategy adopted by the EC in 2006 which recommends the adoption of noise maps and action plans as well as the implementation of actions aimed to reduce noise levels (traffic is the main source).

The relevance is confirmed in the new 7EAP: "Available data on long-term average exposure show that 65 % of Europeans living in major urban areas are exposed to high noise levels and more than 20 % to night time noise levels at which adverse health effects occur frequently". Noise reduction is included in the Priority objective 8: To enhance the sustainability of the Union's cities.

2. Long-term sustainability

The partners involved have been implementing additional solutions to reduce traffic and related noise emissions.

The Municipality of Vicenza established that each year a budget line has to be referred to noise reduction but it's expected that all partner will implement solutions to mitigate the impact of traffic and other sources thanks to specific actions but also thanks to integrated policies and actions (i.e. traffic limitations an reduction in urban transport plan; noise reduction windows in critical buildings together with energy efficiency improvement, etc.).

The best results are expected from the innovation of vehicles and in particular form the hybrid or electric ones.

The procedures proposed by CIRIAF in the action plans to identify solutions according to technical and economic criteria supported PROVGE, PROVSV, MUNVI and MUNPO to identify sustainable solutions and will help local bodies to make their choices sustainable also from the economic point of view.

The involvement of schools and the production of a dissemination tools addressed to them (i.e. e-book and noise game) would support the growth of the attention of young people to this topic.

Together with that of Savona and with the cooperation of the Provincial environmental education Agency, the Province of Genova has been proposing to schools the noise laboratory at no cost, steady during the year.

No direct economic benefit of short-term and long-term is identified.

The reduction of noise levels will improve the urban quality and reduce the negative impact on health according to needs expressed by EC, OSCE, WHO, etc.

3. Replicability, demonstration, transferability, cooperation.

The methodologies developed by NADIA project allow achieving a better management of road noise problems. The procedures could be successfully used by every kind of road managing authorities.

The indicator CBI, for example, allows identifying the most technical and economic efficient noise reduction measure in each area where an action is needed. Being based on European directives and guidelines, the approach can be perfectly transferred all over Europe and up scaled to every kind of road network.

The idea to add value to the project results involving schools is also transferable without any restriction and replicable not only with regard to noise issue.

The NADIA project is mainly a demonstration project. Nevertheless it has also innovative contents being strongly oriented towards final recipients of mapping and planning (the citizens) involving main stakeholders and promoting new emerging noise remediation actions with high performances that use recycled material or innovative solutions (i.e. concerning asphalts and barriers).

The used solutions can be adopted by local authorities (and other organisations) in charge of noise management of infrastructures and urban areas in all Europe. For example, the Asphalt rubber is used worldwide before its introduction in the European and Italian market.

These solutions are typically more expensive than the traditional ones. The EU contribution was very useful to cover this extra cost contributing to increase the market and the prices reduction.

The cooperation with other projects such as HUSH, QUADMAP and HARMONICA allowed to verify that the adopted solutions are innovative at least with regard the European market and they provide the NADIA project with some ideas and information (i.e. noise barriers integration in schools facilities).

4. Long term indicators of the project success.

The main indicator is the noise level related to the works done. How long is the positive impact of the infrastructure? Is it decreasing during the years and how much?

For this reason project partners next years will verify the duration of anti-noise solutions and in particular that of anti-noise asphalts to be compared with traditional ones.

5.4 Dissemination issues

The **envisaged** dissemination activities included actions to disseminate results during the project and to support the dissemination after its end.

Among the first ones there were events, the NADIA working group sessions, and dissemination tools; further dissemination tools would have guaranteed the dissemination after the end of the project.

The planned project events are:

- one workshop to be organised in Perugia at the end of WP2 and at the beginning of the WP3 (month 9); 100 people attending.
- one workshop to be organised when maps are ready and plans are in progress (month 20); 40 people attending
- the final dissemination event; 80 people attending.

The establishment of a working group made of local authorities in charge for noise management and other stakeholders was foreseen. 30 participants were expected. This working-group should have had to meet at least three times during the project.

Dissemination tools to be used during and after the project were:

The project leaflet (D7)

The dissemination plan (D8)

The website (D9)

Dissemination tools conceived to support the dissemination after the project were:

The NADIA project “Fact sheet” (D10)

the Layman’s report (D11)

the project brochure (D12)

D13 is the “Recommendations” that is a deliverable where added value is pointed out exploiting relationships established with stakeholders during the dissemination.

The dissemination recipients are institutional representatives (mayors, deputies, personnel of Municipalities, Provinces and other local bodies, representatives of associations, environmental agencies, etc.) technicians (architects, engineers, etc.) and citizens (families, inhabitants, people working or utilising critical buildings, students, etc.).

In addition the NADIA project and its results had to be presented during CIRIAF conferences 2012 and 2013.

20 articles had to be published in magazines and newspapers.

A dissemination activity addressed to European project and organisations was also foreseen.

5.4.1 Dissemination: overview per activity

- What reactions and feedback was obtained?
- Indicate major drawbacks (cf. section 7 "Problems encountered")

Foreseen dissemination events

Foreseen in the revised proposal	Achieved	Assessment
I workshop (Perugia) April 2011	YES	 <p>40 participants attended the event instead of 100. The LIFE logo has been used in publicity documents, distributed materials and NADIA presentations</p>
II workshop (Arenzano Genova) 19 October 2012 	YES	 <p>It was the V “Day on acoustic” 2012. Participants were 50 instead of 40 as foreseen. The LIFE logo has been used in presentation documents, distributed materials and NADIA presentations</p>
III final event (Genova) June 2014	YES	<p>60 participants instead of 80 as foreseen. The debate was very interesting thanks to the participation of other projects. The LIFE logo has been used in publicity documents, distributed materials and NADIA presentations. A video has been produced available at the following link: http://www.youtube.com/watch?v=4b - Zty6RWY&list=PLcGyMEOYFqJc0tNK4D5E51tBk49E9rJJ</p> <p>Information on the event have been edited by CIRIAF and published also by ARPAT (newsletter) and AIA (Facebook page), available at the following links: http://www.arpat.toscana.it/notizie/notizie-brevi/2014/soluzioni-per-il-contenimento-del-rumore-dalla-mappatura-all2019azione https://www.facebook.com/media/set/?set=a.814576821909938.1073741838.338442212856737&type=3</p>
CIRIAF Conference 2012	YES	<p>The NADIA project was presented according its progress and gave inputs for the programme development. The LIFE logo has been used in publicity documents, distributed materials and NADIA presentations</p>
CIRIAF Conference 2014	YES	<p>The conference has been organised under the NADIA “Umbrella”. 48 people attended this event. NADIA Leaflets and dissemination materials were provided to the attendees at the conference.</p>

Additional events

<p>Workshop on acoustic (Vicenza) 9 March 2012</p> 	<p>The LIFE logo has been used in publicity documents, distributed material and NADIA presentations 27 people plus speakers attended the workshop</p> 
<p>Press conference 22 March 2013</p>	<p>MUNVI organised the press conference, to present the strategic acoustic map (www.comune.vicenza.it/albo/notizie/notizie.php/79792).</p>
<p>Workshop on solutions for noise reduction (Prato)</p>	 <p>Few people participated in this event. Only technicians were interested. The LIFE logo has been used in publicity documents, distributed material and NADIA presentations</p>
<p>Workshop of HUSH project (Firenze) 24/01/12</p>	 <p>“State of the art of urban noise LIFE+ projects” Experiences in different cities and solutions have been presented and compared The LIFE logo has been used in publicity documents, distributed material and NADIA presentations PROVGE, CIRIAF, COMPO, MUNVI and PROVSV attended the workshop. PROVGE and CIRIAF had a speech.</p>
<p>IV “Day on acoustic” October 2011 (Genova).</p> 	 <p>The Province of Genova organised it. The NADIA project was presented in a very initial stage. 100 participants attended the event. The LIFE logo has been used in publicity documents, distributed material and NADIA presentations</p>
<p>Two workshops on environmental noise - June 2011 and 2012</p> 	 <p>Only local bodies’ technicians participated in this event. 40 people each attended the events. The LIFE logo has been used in publicity documents, distributed material and NADIA presentations</p>

<p>VI “Day on acoustic” Oct. 2013 (Genova).</p> 	<p>The Province of Genova organised it and presented the NADIA project and its results in occasion of the “Science Festival”. Comparison with other LIFE projects on noise was very interesting and cooperation among them was strengthened. 50 participants attended the event. The LIFE logo has been used in publicity, distributed material and NADIA presentations <i>Posters of NADIA, HUSH, QUADMAP and HARMONICA projects</i></p> 
<p>Further final NADIA event Savona, 8/5/2014</p>	<p>The Province of Savona organised an additional local event at the end of the project to present the final results mainly to its community but also to regional stakeholders. A video is available at the following link: http://www.provincia.savona.it/news/webtv/progetto-nadia-seminario-conclusivo About 40 people attended this event.</p>
<p>Regional workshop GP WIND 29/09/11</p>	<p>PROVSV presented the NADIA project 18 participants (local bodies) attended the event. The LIFE logo has been used in the project NADIA presentation</p>
<p>Conference <i>Educambiente</i> 01/10/12</p>	<p>PROVSV presented the NADIA project 130 participants attended the event. The LIFE logo has been used in the NADIA presentation http://www.provincia.savona.it/news/webtv/educambiente-2012-convegno-ecoesperienze-si-raccontano</p>
<p>COREM event 16/03/11</p>	<p>PROVSV presented the NADIA project to 100 local bodies representatives. The LIFE logo has been used in the NADIA presentation http://informa.provincia.savona.it/video/corem_16032011</p> 

Additional dissemination activities

- Participation of Municipality of Vicenza in the Smart City Exhibition at Bologna from 16 to 18 October 2013. MUNVI presented the NADIA at its stand that has been visited by hundreds of people (6000 visitors attended the exhibition). The experience was very positive from the quantitative and qualitative point of view.
- CIRIAF presented a paper about noise mapping activities within NADIA project at the 19th International



Congress on Sound and Vibration, Vilnius, Lithuania, July 8-12, 2012. The contents of the article was reported through a PowerPoint presentation

- CIRIAF presented a paper about Noise Action Plans developed within NADIA project at international conference “AIA – DAGA” (18 – 21 March 2013 in Merano, www.aia-daga.eu/index.php/it). The contents of the article was reported through a PowerPoint presentation.



- CIRIAF presented a paper about the structure and the goals of NADIA project at the AIA conference held in Rimini, Italy 8-10 June 2011. The contents of the article was reported through a PowerPoint presentation

- The Province of Genova organised the Education laboratory on noise in Genova from October 23 to 31 in the occasion of the “Festival della Scienza”. Children and boys have been involved in games, discussions related to noise and some results of the NADIA project have been illustrated. In the following link you can find an example of session: <http://www.youtube.com/watch?v=eSzBEGhJN7A>
- The City of Prato participated in the 41° national AIA conference held in Pisa from 17 to 19 June 2014 with the speech “La mappa acustica strategica dell’agglomerato di Prato: difficoltà incontrate e soluzioni adottate”).
- The Province of Genova presented the NADIA project in further events:
 - o National conference on physical agents of Regional Environmental Agencies (ARPA) held in Novara from May 6 to 8 2012
 - o Conference organized in Genova by the Liguria Environmental Agency May 22 2012.

Project dissemination deliverables

The following table is the list of expected deliverable and output as planned in the technical annex to the agreement

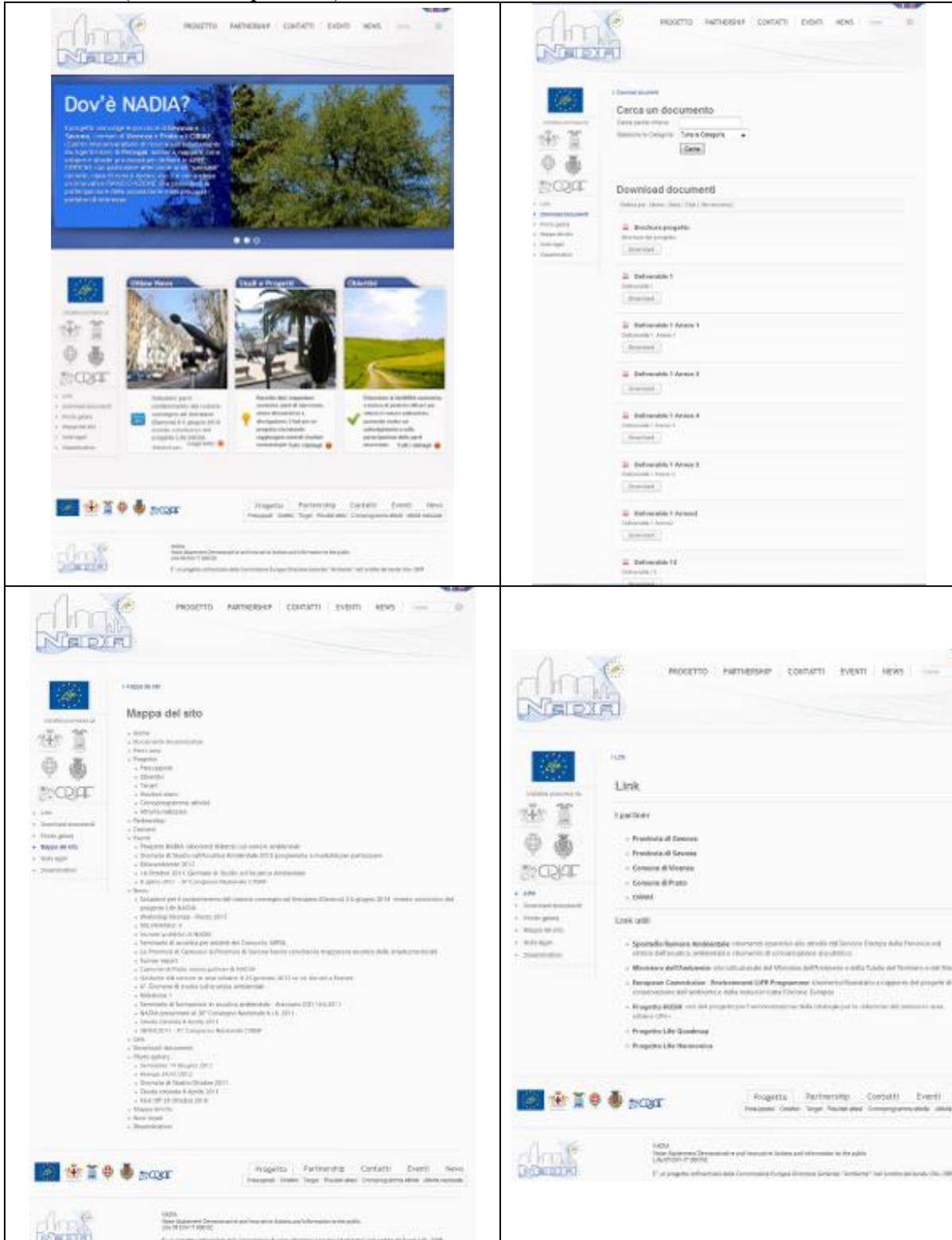
Task	Foreseen in the revised proposal	Achieved	Evaluation
6	Project pamphlet 	YES	Flyer was produced in Italian and in English. It was very useful to introduce people in the project in the occasion of meetings, events, etc. It will be less useful after the project conclusion
6	Dissemination plan	YES	It is a dissemination management tool in excel format and it was updated during

			the project. It was very useful to update just in time the dissemination activities implementation.
6	Project web site www.nadia-noise.eu	YES	It was online at the beginning of the project and it was constantly updated. Visits were satisfactory taking into account that the project topic is technical. See below.
6	NADIA fact sheet 	YES	This tool is very clear and useful to introduce less technical people in the noise issue understanding and in what NADIA project did in the project areas. It is a 4 pages document in English, easily transferable to local bodies of other EU countries.
6	Laymans' report 	YES	To produce this document some of the best Laymans reports published in the LIFE+ web pages have been discussed and the final structure defined to be actual also after the project end.
6	Project brochure*	NO	In the light of the Layman report characteristics (contents, aspect, targets), the project brochure appeared a duplication of such document. The idea shared with the monitoring company was to produce different dissemination tools addressed to schools that are a relevant target of the project that was without a specific project deliverable to be used in terms of transferability of the results. Project resources have been used for three additional dissemination tools described below in this table: - The e-book for schools - Games on noise for schools - The dissemination kit
6	Recommendations	YES	Recommendations have been worked out without difficulties. The cooperation with other projects was useful also in this case. Some Recommendations have been

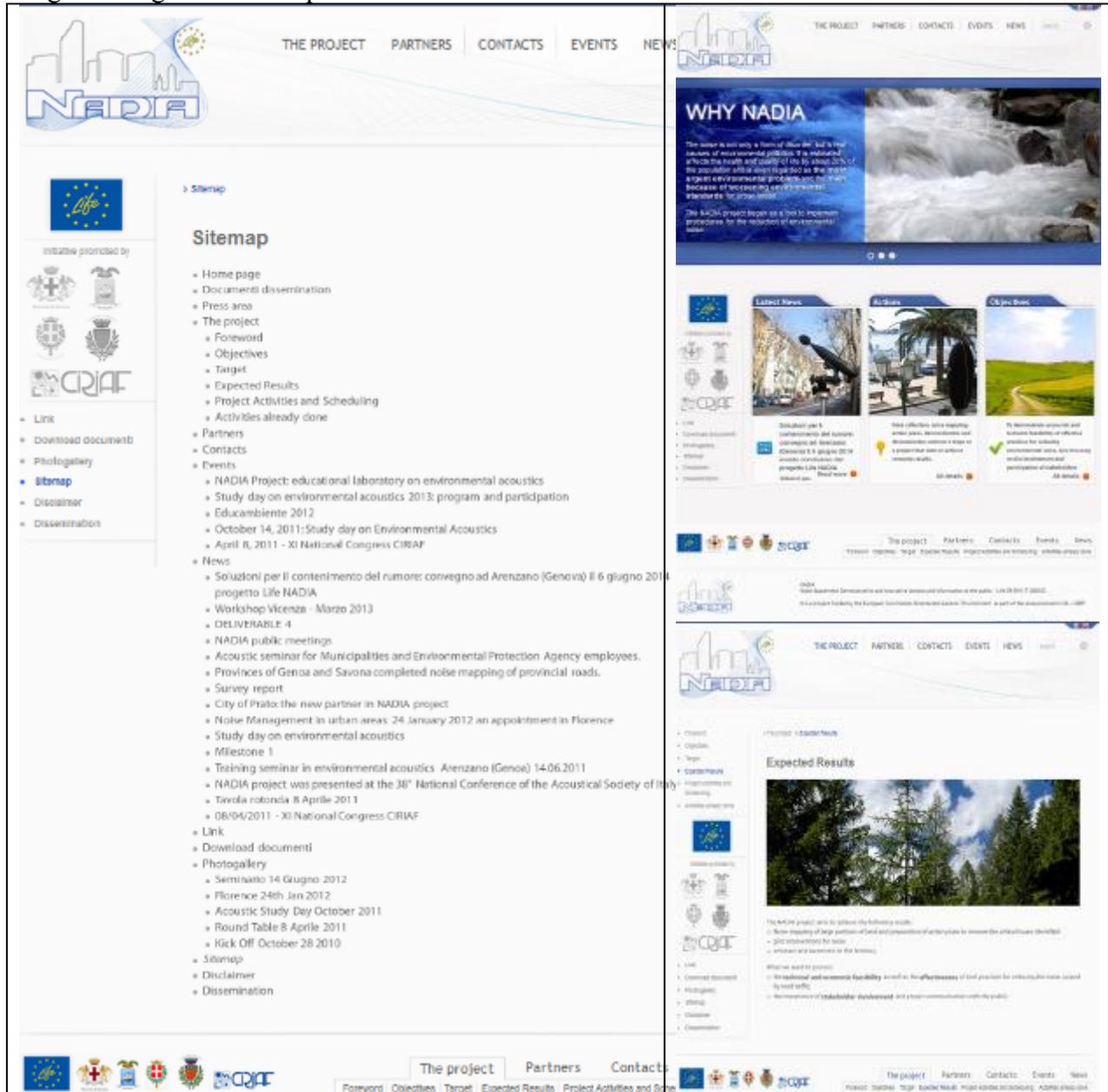
			shared in particular with the HUSH project
6	The e-book “ Noise and surrounding ” (“ <i>Rumore e dintorni</i> ”)		This deliverable fill the gap in the dissemination to schools. It contains information, exercises to support teaching on noise at school as well as to give a learning opportunity to boys and to their families.
6	Games on noise 		The game consists of a dashboard with colored boxes corresponding to different noise levels and a set of playing cards, each corresponding to a sound phenomenon, to be placed appropriately in the box with the corresponding noise level. All prints are FSC certified and Ecoprint
6	Dissemination kit and education kit		They are two kit addressed to two main project targets and they include some of dissemination tools. The dissemination kit is addressed to the technical target and includes the Layman’s report, the fact-sheet and three monographs on noise. 150 copies. The education kit includes a DVD with the e-book and the game. The education kit is a result of the cooperation with projects HARMONICA (partner Bruitparif) and HUSH (Vie-en-rose and City of Florence). Prints are certified FSC and Ecoprint. 300 copies

Web site (www.nadia-noise.eu)

The web site was on-line the 31/12/2010 and it was constantly updated during the project. The first page introduces visitors in the project. Details on actions, objectives and results are easily available as well as the documents produced. (Deliverables and all maps, plans, etc.) The website has been visited 3300 times (3 times per days on the average). 11.000 pages have been read (about three per visit).



Pages in English are also published as well as the deliverables.



Press cuttings

36 articles instead of 20 have been published in scientific publications, magazines and newspapers. They are listed in the “Dissemination plan”.

CIRIAF edited scientific articles that have been published in acts of conferences they attended such as the ICSV symposium, the AIA conference 2011 and AIA-DAGA conference 2013.

The Province of Genova participated in the editing of such publications

Local bodies edited articles for local newspaper.

18 articles have been promoted by the Municipality of Vicenza to inform citizens about noise situation and works and have been published in local newspaper.

In addition to 36 articles, the Province of Genova published also 15 issues of its **newsletter** on noise starting from 2012. **13 issues concerned the NADIA project**. 300 people received the newsletter till now.

The working group

The working group activities have been postponed to allow all the partners to be aligned with the time of producing the maps and action plans.

At the end of the project the three planned sessions have been carried out plus one initial technical session held in Perugia in 2011 where the WG objectives and working methods were defined together with the HUSA project representatives. An attempt was made to organize an additional session but too little time was available to obtain a good participation.

Due to the economic constraints and the difficulties of public employees to travel away from their offices, the working group has been organised at regional level.

A mailing list of 30 local bodies from North East of Italy has been completed.

The first working session has been held in Vicenza the 14 March 2013-.

Nine local bodies participated in the working session plus partners: the Provinces of Bolzano, Trento, Venezia, Verona, Treviso and the municipalities of Bolzano, Verona, Modena, Padova.

The first meeting was focused on the noise mapping and steps needed to move to the planning phase.



31 May 2013 PROVGE organized the second working group session. Speakers are Provincia di Torino, Comune di Genova, Comune di Firenze, ViEnRose Ingegneria S.r.l., Provincia di Genova e Fondazione MUVITA, Tuscany Region. 12 local bodies attended this session and the total participants were 29.

The third working group session has been held in

Vicenza 6/2/2014 (is the II session in Vicenza) and it concerned the connection between the noise reduction planning and the selection of solutions available.

Eight local bodies representatives attended this session included the new participants.



Notice boards

NOTICE BOARDS PROVINCE OF GENOVA



Noise asphalt - Road n. 225



Noise asphalt - Road n. 225



Nursery school "La carica dei 101"



NOTICE BOARDS - CITY OF PRATO



Primary school "Meoni"



NOTICE BOARDS – PROVINCE OF SAVONA



Road n. 334



Road n 29

NOTICE BOARDS – CITY OF VICENZA



Ca' bianca primary school



Ca' bianca primary school



LATTES primary school



LATTES primary school

Notice boards were positioned at all demonstrative sites.

The LIFE logo and the project references are well highlighted.

Two kinds of notice boards have been prepared and used:

- a large version, visible from a distance, placed in public spaces, inside and / or outside of the rooms or areas where interventions were made
- a sticker applied to the installed objects such as windows and barriers (protected).

Project carbon footprint reduction

All the project partners planted trees for offsetting CO₂ emissions produced by the project activities.



The Province of Genova in 2013 planted 660 trees in a rural area in the North/Center of the Province.

The Province of Savona planted 300 trees between February 20 and 21 2014 in “Deiva” regional forest.

The Municipality of Vicenza in autumn 2012 planted 500 trees in different urban areas.

The Municipality of Prato planted about 100 trees in two areas (Ciliani primary school and Via Suor Niccolina infermiera) in February 2014.

Municipality of Prato ceremony

5.4.2 NADIA's Layman's report

The Layman's report is attached to the final report. This is the index:

Activities and results

From data to noise mapping

From noise mapping to noise reduction action plans

Adopted noise abatement innovative solutions

Education

Conclusions and contacts

What are the NADIA's strengths?

Difficulties and lesson learnt

What kind of materials are available?

Who to contact?

5.4.3 After-LIFE Communication plan

The After LIFE communication plan is attached to the final report. This is the index:

The project

1.1 Objectives of NADIA project

1.2 Level of innovation of technology and methodology

1.3 Environmental, social and economic results

1.4 demonstration value – trasferibility – possibilities for replication

1.6 Relevance to environmental policy and legislation

Communication strategy

2.1 Main target groups

2.2 Dissemination activities/products and their results during the project

2.3 Dissemination activities after the project

2.3 Cost and benefits

It has been produced involving stakeholders. In the occasion of the final event a questionnaire was distributed and inputs were obtained.