

DEVELOPMENT OF LIFE MONZA PROJECT: INTRODUCTION AND MANAGEMENT OF NOISE LOW EMISSION ZONES

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Summary

The first objective of LIFE MONZA project (Methodologies fOR Noise low emission Zones introduction And management - LIFE15 ENV/ IT/000586), co-funded by the European Commission, concerns an easy-replicable method for the identification and the management of the Noise Low Emission Zones, an urban area subject to traffic restrictions, whose impacts and benefits regarding noise issues will be analyzed and tested in the pilot area of the city of Monza, located in North Italy. Other objectives include the monitoring and the analysis of the effects, due to the introduction of the Noise Low Emission Zone, on air quality improvement and on the wellbeing conditions of the citizens in pilot area, the identification of the type of interventions that can induce positive effects, such as those relating to the mobility management and the adoption of low-noise pavements, and the active involvement of the people in the definition of a more sustainable lifestyle. The project started in September 2016 and all actions are in progress. In this paper an overview of the implementation of the project activities and the preliminary results will be described and discussed.

1. Introduction

The Low Emission Zones (LEZs), considered as urban areas subjected to road traffic restrictions, have been introduced with the scope to ensure compliance with the air pollutants limit values, set by the European Directive on ambient air quality (2008/50/EC) and they represent a common and well established approach carried out by the administrative government of the cities able to improve environmental quality and to reduce health risks due to road traffic conditions. Currently, LEZs have been introduced in many European cities [1], becoming the most important measure to reduce road traffic in urban area and, at the same time, identifying some eco-innovation

solutions, able to find a balanced environmental improvement, taking into account also the technical and economic feasibility and the social acceptability.

So, the effects of LEZs implementation on air quality improvement are widely analyzed and many studies have been carried out, having different and contrasting results. In most cases LEZs are considered to be an effective measure to reduce traffic-related air pollutants levels, whereas the effects and the potential benefits concerning the noise reduction have not been addressed in exhaustive manner. Noise issue is not taken into account and consequently no specific interventions against noise have not been foreseen and implemented.

LEZ measures implementation (viability restrictions, replacement of road pavement, pedestrians crossing) in order to assess the reduction of noise, the complimentary effects on air quality and how these measures reflect on well-being conditions and quality of life for citizens living around the pilot area.

A set of indicators, distinguished in different topics, have been identified. Noise indicators, such as percentage of people exposed to defined values of L_{den} and L_{night} , air pollution indicators, as particular matter, and socio-economic indicators, as commercial activities and people employed, will be analyzed during the project. Health indexes will be introduced and evaluated after the ante and the post-operam phases of the NLEZ introduction and also combined with indicators of noise and air quality in a global index for noise LEZ. The methodologies for NLEZs introduction and management will be tested in the pilot area of Libertà district, in Monza (see Figure 1): it is a densely populated area with about 8,000 inhabitants, located in the North-Eastern side of the city of Monza, crossed by a major road (Viale Libertà). This road is daily crossed by about 30,000 vehicles. It is one of the most important access roads to Monza from Eastern surrounding area and towns and currently it is also the primary East-West corridor North of the city.

Significant average levels of noise pollution affect a large number of citizens so that Libertà district is identified as a hotspot in the Action Plan of the city of Monza. Noise strategic map of the city of Monza, dated 2012, highlights that in a range of 30 m from the Viale Libertà almost the 100% of the receivers is exposed to levels higher than 65 dB(A) during the day and 55 dB(A) during the night. Results expected from the LIFE MONZA project, concerning the pilot area, in terms of noise reduction, air quality and well-being conditions in the Libertà district, are potentially able to guarantee a better environmental state.

4. Monitoring activities

To get the reduction of the average noise levels in the pilot area of Libertà district, together with a improvement of the air quality and benefits on wellbeing conditions of inhabitants, the implementation of the NLEZ will be analyzed, in *ante* and *post-operam conditions*, and noise as well air quality and quality of life monitoring campaigns will be conducted.

4.1 Noise monitoring

Noise monitoring activities will be carried out, in *ante* and *post-operam conditions*, using both standard equipment (using sound level meters of class I precision for *long-term* as well *spot* measurements) and a smart low-cost monitoring system. The prototype system for smart monitoring activity of noise has been designed and implemented, in order to be used as a *continuous monitoring* unit in the *ex ante* and *ex post scenarios* (see Figure 2).



Figure 2: Smart-noise monitoring system

After the end of LIFE MONZA project, the prototype will be given for free to Municipality of Monza that will take care of using it for monitoring activities in the three years after the project end. In the pilot area n°10 monitoring stations have been installed in the pilot area (see Figure 3) and they have been located on streetlight or on façade (at height 4 meters) powered by solar panel and energy network (see Figure 4).

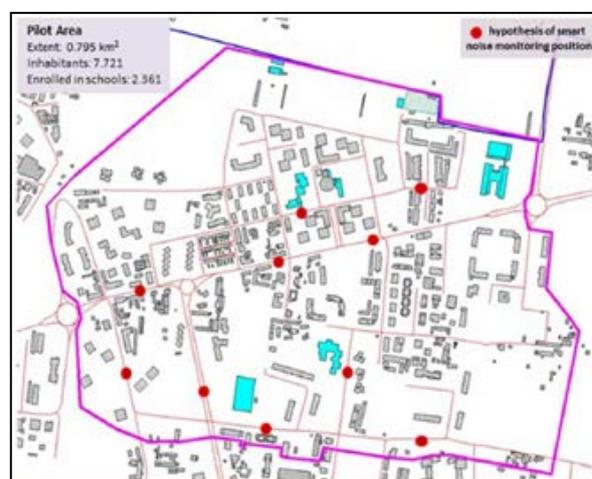


Figure 3: Smart-noise monitoring system - Map



Figure 4: Smart-noise monitoring stations

An automatic road traffic monitoring system will also be used, in order to support long and short term noise monitoring activities and also air quality analysis.

4.2 Air quality monitoring

Air Quality monitoring within the pilot area is in progress, according to requirements provided by Directive 2008/50/EC on ambient air quality and cleaner air for Europe. The objectives of monitoring will be to assess whether the implementation of the noise low emission zone contributes, as an additional effect, to reduce air pollution levels in the pilot area.

A first study regarded the temporal variability of gaseous and particulate pollutants (e.g. SO_2 , CO) in the pilot area and a monitoring campaign has been carried out before and after the LEZ introduction, by the Environmental Protection Agency of Lombardia Region. In the period May 2017- February 2018 has been concluded the *ex ante* monitoring campaign. In the years 2019-2020 is foreseen the *ex-post* campaign, after LEZ implementation. Another study on spatial variability of gaseous pollutants (as nitrogen dioxide NO_2 , benzene) in the pilot area has been provided by the above mentioned Environmental Protection Agency basing on a monitoring campaign before the LEZ introduction using passive samplers. In the period May 2017-February 2018 has been concluded the *ex ante* monitoring campaign. In the period July 2017-February 2018 has been concluded the *ex ante* monitoring campaign. In the years 2019-2020 is foreseen the *ex-post* campaign, after LEZ implementation.

4.3 Quality of life

A survey about the perception of the life conditions, noise and air quality has been planned in ante and post-operam phases, in order to analyze and evaluate changes in perceptions and judgments of different groups of citizens in the pilot area.

The activity started in 2017. A survey with separate samples was administered for people living in the Libertà district started, aimed to survey residents' perceptions, opinions and attitudes on a series of aspects related to the livability of the district and to the conditions of environmental and social well-being. This survey implies the administration of a questionnaire both before (*pre-test*) and after (*post-test*) the interventions implementations, to analyze and evaluate the changes occurred in the perceptions and judgments of the different groups of citizens of the area. The survey includes questions about socio-demographic data, building (location, noise exposure, time spent at home), quality of life in the district (opinion on social, economic and environmental aspects), perception about air quality, perception about noise, health and life quality, transport mobility situation, potential effects of LIFE MONZA project on local system aspects. A second section of the questionnaire follows with a "short" test on the quality of life concerning the WHO Quality of Life-BREF (WHOQOL-Bref) questionnaire, that has a specific environmental domain, it can be self-administered and it is already validated in Italian language. Currently the questionnaires filled in are 100, equal to about 17.5% of the sample (570 expected) Further actions about the questionnaire administration are in progress, in order to guarantee the expected number of compiled copies.

5. Botton-up activities: people involvement

The challenge is to discover and to build together the territorial identity and the characteristic of the noise LEZ area, through initiatives able to design a part of the city and to share new lifestyle choices. This is implemented through the involvement of the Schools located in the pilot area of LIFE MONZA (primary and high schools), in particular the students, parents and teachers. Moreover, is important to share ideas and solutions with inhabitants of the pilot areas as well as the Associations of Monza municipality, the Consult neighborhood and the NLEZ users (companies, transport companies, owners of private vehicles). Meetings have been organized in the primary and high schools located in Libertà district to raise awareness in students about noise and a sustainable home. During the INAD – International Noise Awareness Day, several practical experiences and events in acoustics have been organized for students with great participation and enthusiasm among the children. Moreover, ideas contests in the high schools, about a new logo, and in primary schools about a symbolic picture for identifying noise LEZ have been launched and they will be completed during the May 2018. Another initiative regards the use of a mobile App, developed during the course of the project, dedicated to the management of sustainable actions, voluntarily undertaken by citizens, to “measure” benefits and concrete changes in people lifestyle, to be transposed in a bonus for citizens.

6. Conclusions

The first objective of LIFE MONZA project is to develop an easy-replicable method for the identification and the management of the Noise Low Emission Zone (Noise LEZ), to be intended as an urban area subject to road traffic restrictions where low noise levels are also achieved.

The project, co-funded by the European Commission, started in September 2016 and the completion date is scheduled for the 2020. The project focuses on environmental noise topic, but the potential synergies with air quality improvement and quality of life conditions will also be analysed.

The project can give contribution to the policy measures and implementation at European, National and local levels.

At European level, in order to contribute to the implementation of the European directives, avoiding duplications and overlaps, potential synergies existing between the issues related to noise pollution and air quality will be investigated during the project. Being the project focused on noise issue, the methodology developed for Noise LEZ will contribute to the implementation of the END, particularly regarding the noise action plans, designed to manage noise issues and their effects, exploring the effectiveness and potential benefits due to the introduction of Noise LEZ.

At National level, the results of the project can be applied for the definition of an harmonization and simplification process among transposition decrees of EU Directives concerning noise pollution and air quality and for the development of a proposal of a common method for identification and management of Noise LEZ.

The local level is very important, because the governments of the municipalities introduce and manage the Noise LEZs and the availability of a common procedure and the knowledge about the impacts and benefits due to Noise LEZ introduction can contribute to make the cities more sustainable and to enforce the dialogue between public institutions and citizens.

Acknowledgement

The authors would like to thank all who sustained them with this research, especially the European Commission for its financial contribution to the Project into the LIFE+2015 program.

References

- [1] Ecorys, Feasibility study: European city pass for low emission zones, Annex A: Standards and Guidance Document. Rotterdam, (2014).
- [2] Borchì, F., Carfagni, M., Governi, L. The H.U.S.H. project - An harmonized methodology for action planning, Proceedings of the 9th European Conference on Noise Control, 345-350, Prague, Czech Republic, 10-13 June, (2012).
- [3] Borchì, F., Carfagni, M., Curcuruto, S., Governi, L., Silvaggio, R., HUSH project results: definition of a platform for an integrated and harmonized noise Action Plan and proposals for revision of Italian legislation and END Directive, Proceedings of AIA-DAGA Congress, Merano, Italia, (2013).
- [4] Carfagni, M., Bartalucci, C., Borchì, F., Governi, L., Aspuru, I., Bellomini, R., Gaudibert, P., Petrucci, A., Weber, M., Life+2010 QUADMAP project (Quiet Areas Definition and Management in Action Plans): the new methodology obtained after applying the optimization procedures, Proceedings of the 21st International Congress on Sound and Vibration, Beijing, 13-17 July, (2014).

- [5] Borchi, F., Bartalucci, C., Carfagni, M., Governi, L., Zonfrillo, G., Bellomini, R., Wolfert, H., Aspuru, I., Gaudibert, P., LIFE+2010 QUADMAP project (QUiet Areas Definition and Management in Action Plans): results of post operam data analysis and the optimized methodology, Proceedings of 22nd International Congress on Sound and Vibration, Florence, July, (2015).
- [6] Bartalucci, C., Borchi, F., Carfagni, M., Governi, L., Bellomini, R., Luzzi, S., Asdrubali, F., D'Alessandro, F., Schiavoni, S., Contributions to END interpretation and implementation from the Italian case studies of EU funded projects HUSH, NADIA and QUADMAP, Proceedings of 23rd International Congress on Sound and Vibration, Athens, Greece, 10-14 July, (2016).