Methodologies fOr Noise low emission Zones introduction And management

LIFE MONZA

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LIFE15 ENV/IT/000586

Layman's report

ISPRA
Istituto Superiore per la Protezione
e la Ricerca Ambientale

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LIFE MONZA is co-financed by LIFE+, the financial instrument for the environment of the European Commission (LIFE15 ENV/IT/000586)

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Goal: to evaluate a new methodology for noise management within a LEZ, which will be applied in a pilot area in the city of Monza, Italy. The methodology should be easily replicable and will contribute to the implementation of the EU Environmental Noise Directive (END), which requires noise management plans to be drawn up.

Coordinating beneficiary: ISPRA - Istituto Superiore per la Protezione e la Ricerca Ambientale; Italian National Institute for Environmental Protection and Research

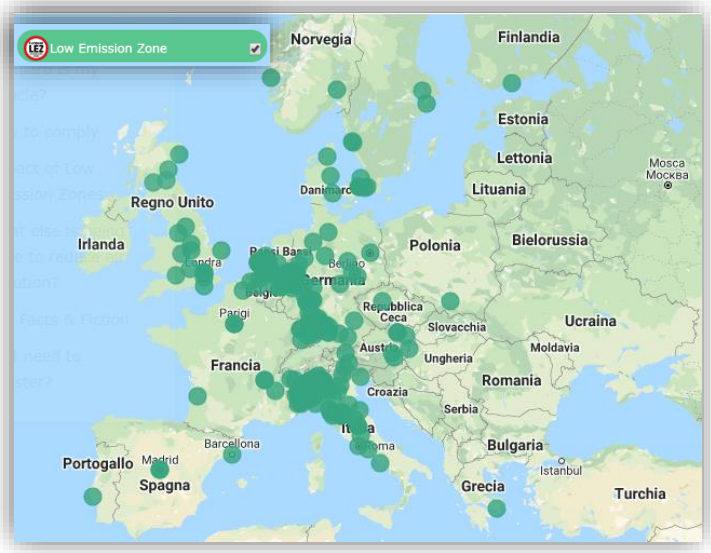
Partners: Vie En.Ro.Se Ingegneria srl – Italy, University of Florence – Italy, Comune di Monza - Italy

Project website: http://www.lifemonza.eu/

Background

What are Low Emission Zones?

Low Emission Zones (LEZs) are introduced in compliance with Directive 2008/50/EC, as mitigation measures suggested in the drafting of local, regional or national air quality improvement plans. Restrictions may concern, with decisions taken at municipal level, the prohibition of access to the most polluting vehicles, speed limits or limits for the type of vehicle, heavy or light, access for payment or not.



Institution of LEZs at EU level, image taken from https://urbanaccessregulations.eu/userhome/map.

Which are current limits of Low Emission Zones?

A harmonized definition of LEZ is not available yet and it is not officially provided at European level. The main environmental aspect addressed to the LEZs is a good air quality, whereas there is no reference to noise.

Are noise Low Emission Zones mentioned in any European directive on noise?

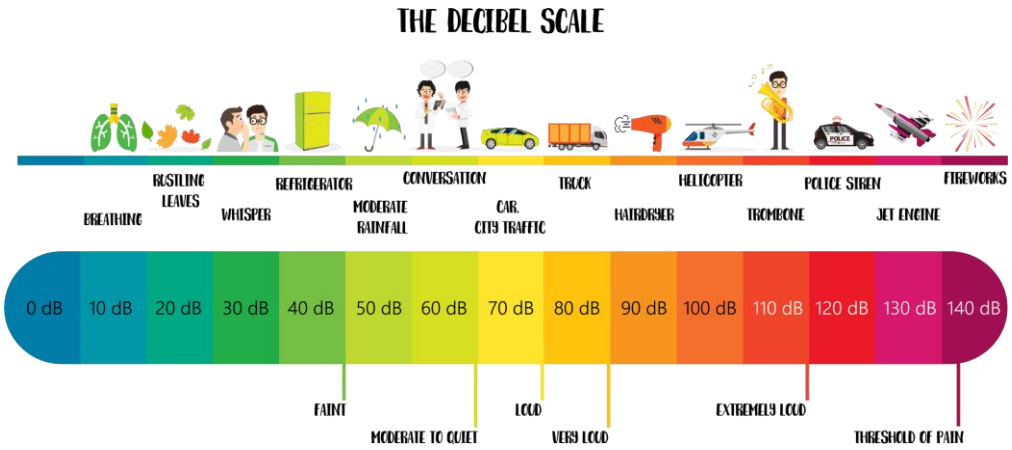
Only in an indirect way. In fact, Directive 2002/49/EC on the assessment and management of environmental noise (Environmental Noise Directive - END) requires Member States to draw up action plans to manage noise problems and their effects and indicates, as measure to be taken, traffic planning, which can be linked to the introduction of noise Low Emission Zones.

Which are the effects of noise pollution?

Noise pollution is a major environmental health problem in Europe. It is caused by a varied number of sources, especially road traffic, and is widely present mainly in the busiest urban environments. The adverse effects can be found in the well-being of exposed human populations, in the abilities of children to learn properly at school and in the high economic price that the society must pay because of noise pollution.

How to measure noise?

Sound is a pressure variation that can be heard by the human ear, over a frequency range from 20 Hz to 20 kHz for a young and healthy person. The sound pressure level of audible sounds is usually expressed in a logarithmic scale which extends from the hearing threshold of o dB to the pain threshold corresponding to 130 dB. Although an increase of 6 dB represents a doubling of the sound pressure level, an increase of about 10 dB is necessary for subjectively higher sound (the smallest changes that can be perceived correspond to 3 dB).



dB scale - Header image: Thaut Images, Adobe Stock

Project's objectives

1) To introduce an easy-replicable method for the identification and the management of noise Low Emission Zones.

2) To test the methodology in a pilot area of the city of Monza (Italy).

3) To implement "top-down measures" concerning traffic management and road paving substitution in correspondence of a section of Viale Libertà in Monza characterized by significant flow rates (about 30,000 vehicles a day in both directions).

4) To turn the Libertà district (total population 15000 people) in a permanent noise LEZ, also by means of the promotion of "bottom-up measures" related to citizens involvement for an active management system of lifestyle choice (development of a devoted App, organisation of a competition of ideas, etc.).

5) To obtain a main average noise reduction and an air quality improvement in correspondence of the Viale Libertà axis and Libertà district.

6) To design new smart and low-cost monitoring systems for noise.

Partnership

To meet these goals, LIFE MONZA coordinating beneficiary, ISPRA (Italian National Institute for Environmental Protection and Research) and partners, Vie En.Ro.Se Ingegneria srl, University of Florence, Comune di Monza, defined a core of activities.

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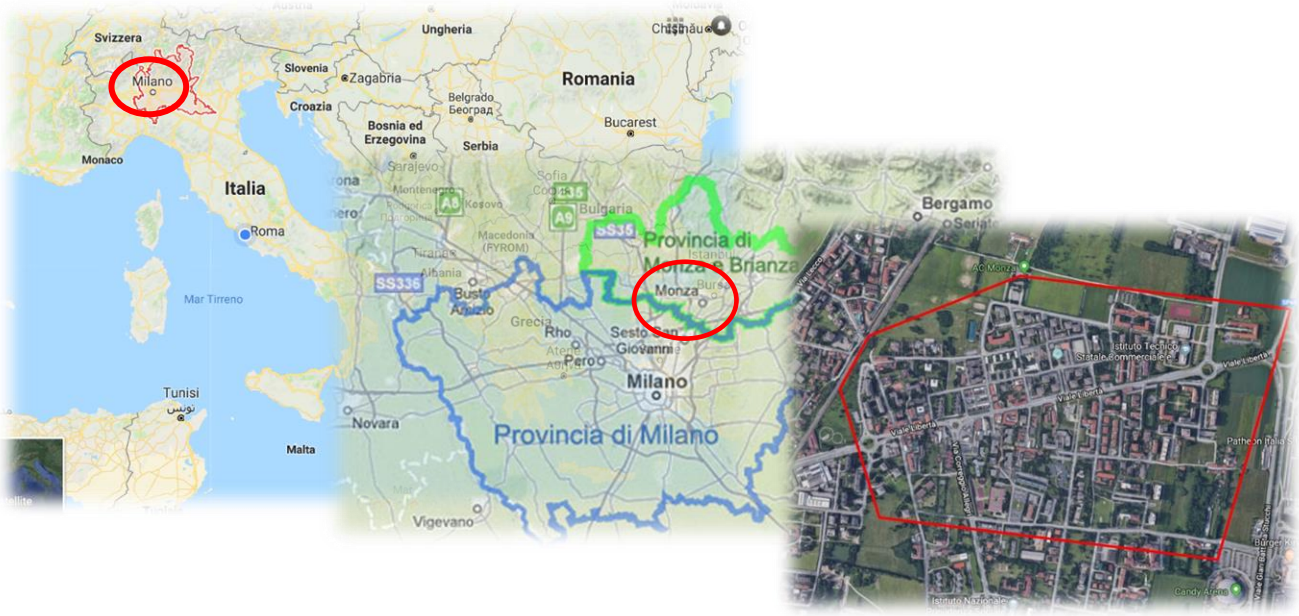
The pilot area

The Libertà district of Monza (Italy) has been identified as a critical area in the Action Plan drawn up pursuant to the END Directive. The strategic map of the Municipality of Monza shows that within a distance of 30 m band from Viale Libertà 100% of the receivers are exposed to noise levels higher than 65 dB(A) during the day and 55 dB(A) at night.



The top-down activities

1) Road pavement replacement of Viale Libertà in September 2018, with a bituminous conglomerate whose grain-size characteristics are able to reduce noise caused by the contact of the wheels with the road surface.

2) Road traffic management: on Viale Libertà institution of new lower speed limits and from December 2018 to June 2019, vehicles over 3.5 t forbidden to pass through Viale Libertà and from July 2019 to July 2020 vehicles over 7.5 t are forbidden.

3) Introduction of two protected pedestrian crossings.

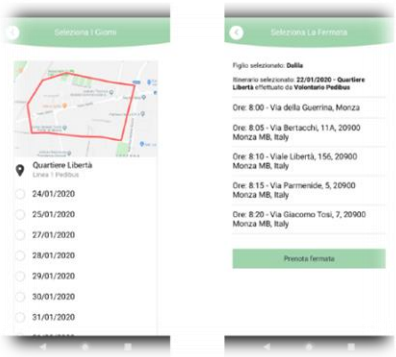
The bottom-up activities

- Participation of some schools of Monza in the Noise Awareness Day in the years 2017, 2018 and 2019.

- Elaboration and administration of a questionnaire on quality of life, perception of noise and air quality with the involvement of the students for administration, collection and analysis;

- Realization of training meetings with about 500 students on topics related to sound physics, noise disturbance and acoustic comfort;

- Activation of a school-work alternation course with students from three classes with the aim of providing them with basic theoretical notions on acoustics and involving them in a project to upgrade the acoustic comfort of a classroom;



- Creation of a competition of ideas for the creation of a logo and a slogan for the communication and promotion of the Noise LEZ of the Libertà district;

- Activation of the "Pedibus Libertà" service from the school year 2018/2019;

- Development of a free App to provide up-to-date information on the project, for the management of the Pedibus service by parents and carers and to stimulate sustainable lifestyles through the awarding of rewarding "green points".

Monitoring systems

NOISE

1) New smart and low-cost noise monitoring system developed during the project, continuously working since June 2017 in ten positions of the Libertà district. At the end of the project, the prototype will be delivered free of charge to the city of Monza, which will use it for monitoring activities in the following three years.

2) Traditional noise monitoring chain with which to periodically check the smart system

AIR QUALITY

The campaigns carried out by the Regional Centre for Air Quality Monitoring of ARPA Lombardia, aimed at characterising the spatial variability in the area of some pollutants mainly related to emissions from vehicle traffic (benzene, toluene and nitrogen dioxide), measurements were carried out using passive samplers installed in 25 different points, both inside and outside the noiseLEZ. Monitoring was carried out by means of a mobile vehicle located in Viale della Libertà and the results were compared with those obtained from the air quality monitoring network in Lombardy.

Obtained results and benefits

NOISE

The reduction in noise levels measured during the daytime period is 2 dB(A). In the 'evening' and 'night' period this reduction is 5-6 dB(A). These results were confirmed by the monitoring carried out with smart sensors whose use proved to be effective and less expensive than traditional systems.

TRAFFIC

The introduction of the limitation of heavy vehicles led to a significant reduction in transits, of about 17% measured in winter, and even about 30% in summer. Average daily traffic flows are also reduced of about 5%.

AIR QUALITY

The effect of the introduction of NLEZ on air pollution seems to be negligible for PM fractions related to combustion and carbon. Monitoring with passive samplers showed the existence of a statistically significant spatial gradient on the microscale and its seasonal variability. The results are comforting in terms of the ability of the models used (GAM) to reliably describe the spatial variability of traffic-related pollutants and to identify the variables that "explain" at least part of this variability.

QUESTIONNAIRES

From the analysis of the answers to the questionnaire, it can be seen that the intervention that found the highest consensus among the interviewees was that of low-emission resurfacing, which for most subjects led to a significant reduction in traffic noise. Moreover, with regard to the ex-ante phase, there is a positive correlation between concentration levels, sleep disturbances and the position of the dwelling not found in the post-operam phase and this could be an indication of the effectiveness of the new low-emission paving and of the NLEZ institution.

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