



LIFE18 ENV/IT/000201

With financial support from the EU LIFE programme



LIFE E-VIA PROJECT: NOISE, ELECTRIC VEHICLES AND TYRES

Arnaldo Melloni, Gessica Pecchioni – Municipality of Florence (Italy)

Sergio Luzzi, Raffaella Bellomini – Vie en.ro.se Ingegneria s.r.l, Florence (Italy)

gessica.pecchioni@comune.fi.it

PROJECT OVERVIEW



LIFE E-VIA: Electric Vehicle noise control by Assessment and optimisation of Tyre/road interaction

PROJECT LOCATION: Florence Italy

BUDGET INFO:

Total amount: 1.797,030 €

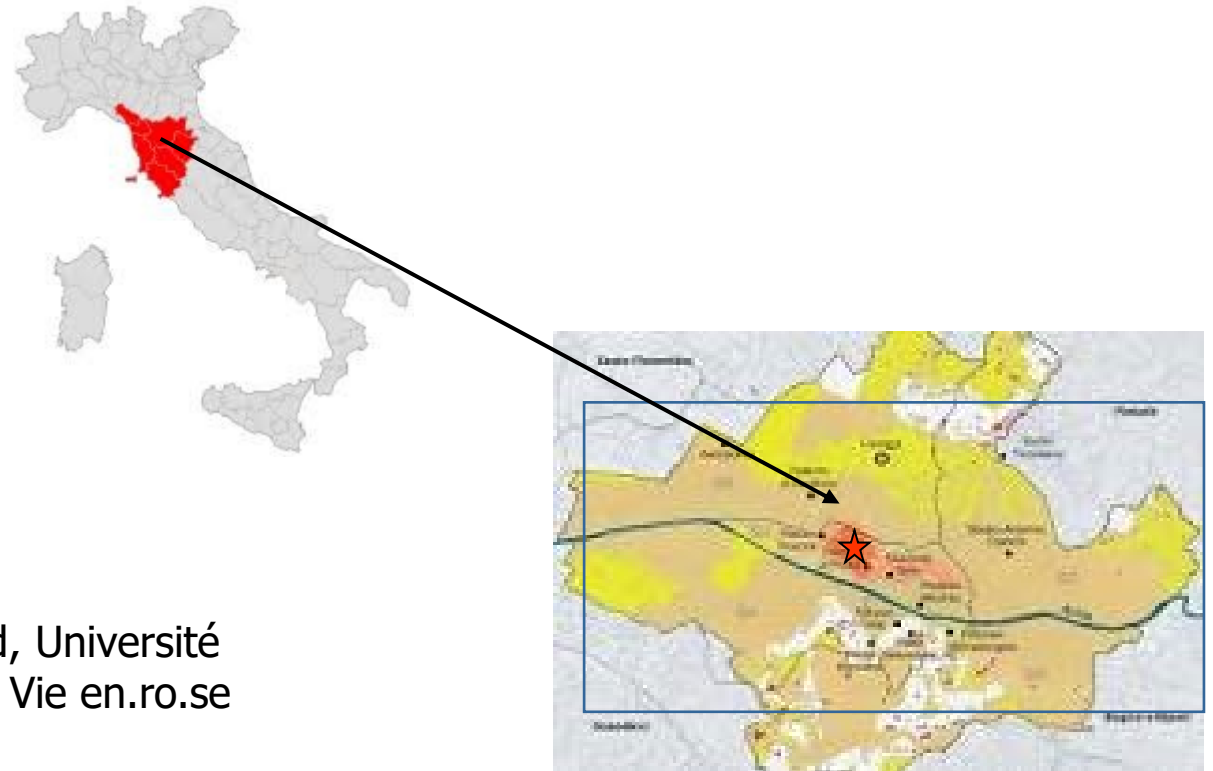
55% EC Co-funding: 933,295 €

DURATION: 01/07/2019 - 31/01/2023

PROJECT PARTNERSHIP:

Coordinating Beneficiary: Florence Municipality

Associated Beneficiaries: Continental Reifen Deutschland, Université Gustave Eiffel, Ipool S.r.l., University of Reggio Calabria, Vie en.ro.se Ingegneria S.r.l



INTRODUCTION



- The LIFE E-VIA project focuses on noise pollution due to road traffic, looking at a future perspective in which electric and hybrid vehicles will be a consistent portion of the traffic flow.
- One of the BEST solutions universally recognized to reduce noise in urban areas, from both the point of view of noise and air quality, is the introduction of electric mobility.
- Traffic noise mainly consists of powertrain noise and tyre/road noise (i.e. rolling noise). With the progress of modern Internal Combustion Engines (ICE), tyre/road noise dominates after 40 kph for steady-speed traffic.

OBJECTIVES AND SCOPE 1/2



1. To reduce noise for roads inside very populated urban areas through the implementation of a mitigation measure aimed at optimizing road surfaces and tyres of EVs. Two road surfaces, at least five different EV types, one reference ICE Vehicle (ICEV) and at least three types of tyres per vehicle type (including tyres specifically designed for EVs) will be tested.
2. To estimate the mitigation efficiency and potential of tyres, pavements and traffic (traffic spectrum, speeds, handling conditions) at a higher and comprehensive level: a Life Cycle Analysis (LCA) and a Life Cycle Cost Analysis (LCCA) will be performed to demonstrate the individual and synergistic efficiency of pavement surfaces, tyres and vehicles (including the comparison between internal combustion vehicles, mixed traffic, and EV traffic).
3. To raise people's awareness of noise pollution and health effects explaining the opportunities provided by EVs through specific dissemination and promotional events, also investigating people perception regarding noise in terms of soundscape methodology and involving them in noise data acquisition.

OBJECTIVES AND SCOPE 2/2



4. To demonstrate and promote sustainable road transport mobility (electric), reducing noise emission by 5 dB(A) at receivers' roadside and achieving also CO₂ emissions reduction (21%), based on the Italian context (LPG, CNG, Hybrid, EV, petrol cars, diesel cars) and the concerned literature.
5. To encourage low-noise surfaces implementation in further EU and extra-EU scenarios, demonstrating durability and sustainability, through in-depth LCA&LCCA.

LIFE E-VIA: A PILOT PROJECT



The pilot character of the LIFE E-VIA project is embedded in the development and testing of a new method, which has not been applied or tested before or elsewhere worldwide, for optimizing the tyres/low noise surfaces coupling, specifically for electric and hybrid cars, with the aim to reduce noise and to maintain performance and durability, without increasing costs with respect to standard surfaces and tyres.

From the analysed state of the art, it turns out that the innovative contribution of the LIFE E-VIA Project consists in the implementation of innovative solutions for enhanced quiet pavements for EV/hybrid vehicles for optimizing them from the acoustic point of view to reduce the exposure to noise. Results are expected to be obtained mainly based on techniques already applied in other contexts, though distinctly, such as measurement techniques through standard methods like CPX, CPB and SPB.

NETWORKING ACTIVITIES



Networking activities are on going with the following previously funded projects, in particular:

- from LIFE NEREIDE (ongoing) project, the mixture design of low noise surfaces and innovative monitoring methodologies will be transposed
- from FOREVER project results about electric vehicle noise emission will be applied
- from LEO and COMPETT project results about CPX measurements of electric vehicle will be evaluated

EXPECTED IMPACTS



- **Awareness raising:** 20.000 individuals reached.

The estimation has been based on the experience on previous LIFE Projects and it based on the several initiatives that are planned to be organized during the project (e.g. EV festival).

- **Noise level reduction:** Reduction of L_{den} and L_{night} noise level -5dB(A). The estimation of noise exposure at receivers living roadside. It is expected to have 5 dB(A) less than without mitigation at the end of the project.

- **Soundscape improvement:** acoustic perception and comfort of an optimized asphalt and EV respect to standard one. The estimation of the perception's improvement will be verified according of the questionnaires that will be collected.

- Number of **people affected by noise reduction:** 2000 people.

The estimation is based on the evaluation of the number of residents in a buffer of 50m from the street's axis.

POLICY IMPLICATIONS



- Contribute to national and Italian regional policies, issuing guidelines about use and application of the methodology output of the project, which will be adopted, through the Regional Env. Agency (ARPAT), supporting the project, by Tuscany Region, strongly interested in noise issues (partner of LIFE NEREIDE and Leopoldo project, and issued a law about control of road pavements with CPX method). Calabria Region and Città of Reggio Calabria also expressed their interest
- Contribute to EU legislation effective implementation (EU Directives 2002/49/EC and 2015/996/EC), providing rolling noise coefficients within the Common Noise Assessment Method (CNOSSOS-EU), specifically tuned for EVs which are actually in need of data for practitioners, agencies, and departments aiming at developing future scenarios

The Municipality of Florence will continue maintaining and monitoring effects of the optimize pavements in the 3 years after the project's end.

The Municipality of Florence commits itself to apply the proposed solution in the ZEZ areas (Zero Emission Zones), where only EVs are admitted and the method will be perfectly applicable in future maintenance operations (wearing course substitution), especially in the areas with high transit percentages of EVs.

The solution proposed and optimized during the project will be easily replicable in other urban areas, also by actors different from project partners.

The guideline for tested and optimized methodology application will be provided as a project output

WHAT HAS BEEN DONE SO FAR...



- 1) Completion of technical reports on preparatory actions dealing with: literature review on EVs and their noise emission, track design focusing on quiet pavement technologies and their performance over time, design or performance requirements for a holistic low noise tyre for EV applications. All reports are available at <https://life-evia.eu/documents/>.
- 2) Completion of design of prototype pavement mixtures (volumetrics, materials and surfaces textures)
- 3) Laying of the prototype pavement in Nantes
- 4) 2 pass-by measurement campaigns have been carried out and 8 different vehicles have been tested, including 7 EVs and 1 ICEV.
- 5) The template of the three questionnaires to be submitted during as many activities to be organized once the pilot case will be implemented in Florence have been drafted.
- 6) Despite Covid-19 pandemic, 2 noticeboards have been produced, 5 papers have been published on journals/submitted for conferences and 4 presentations have been made during conferences.

CONCLUSION



In Europe, the acoustic scenario at urban level is mainly characterized by road traffic noise.

In this framework, the LIFE E-VIA project proposes some prototypal solutions leading with optimal road surface for the specific context of EV fleet and tyres to be developed in order to give an optimal holistic relation between low exterior noise and other key performances.

These solutions are accompanied by soundscape analysis activities, estimation of EVs rolling noise coefficients for the local fleet in order to implementation of EU legislation, Life Cycle Analysis and Life Cycle Costing to evaluate the track efficiency from a comprehensive point of view.

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e-Forum Acusticum 2020

Dec 7-11, 2020



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Ingegneria

Thanks for your attention

Contacts:

gessica.pecchioni@comune.fi.it

arnaldo.melloni@comune.fi.it

sergio.luzzi@vienrose.it

raffaella.bellomini@vienrose.it

To stay tuned on the project progresses, visit the website
<https://life-evia.eu/>