# LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/ road interaction

# Dissemination and participation photo album

By Vie en.ro.se. Ingegneria

With the contribution of the LIFE programme of the European Union

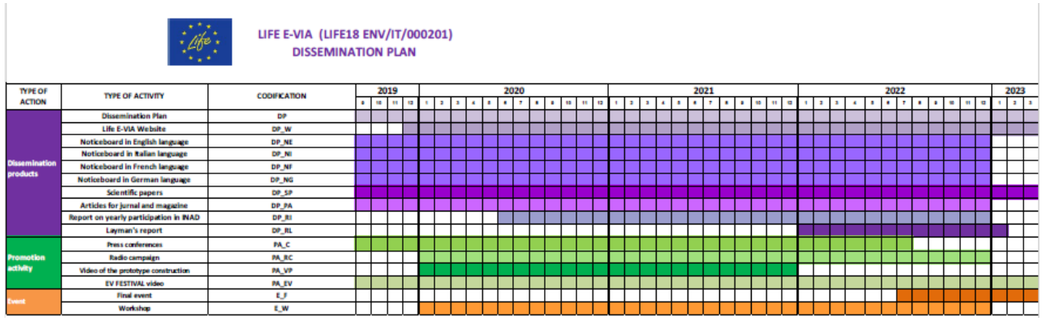
**LIFE18 ENV/IT/000201**

# Kick off meeting of partners

**Issued on: September 2019**

**By: All partners**

**MEETING**


Vie en.ro.se.
Ingegneria

## Action D1 – Proposals for the Project's logo overview

1 2 3 4

PAESAGGIO SONORO — soundscapes of WORK and of PLAY — 9th international FKL symposium on soundscape

S. Cesario di Lecce, 3-6 October 2019

# The lost sounds rediscovered by the students of the schools that participated in the INAD 2019 initiative

Chiara Bartalucci, Sergio Luzzi, Raffaella Bellomini,
Sara Delle Macchie, Rossella Natale

PAESAGGIO SONORO — soundscapes of WORK and of PLAY — 9th international FKL symposium on soundscape

*Meetings and workshops with acoustics experts*
*In the frame of EU-funded projects*

Life MONZA
Methodologies fOr Noise low emission Zones introduction And management

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/road interaction)

# EUROCITIES- Meeting in Oslo during the Environment Forum

**Issued on: October 2019**

**By: Comune di Firenze and Vie en.ro.se. Ingegneria**

**MEETINGS OF THE EUROCITIES**
Code: M_1

« **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: Start: 01/07/2019 - End: 31/01/2023**

**PROJECT'S IMPLEMENTORS:**

**Coordinating Beneficiary: Florence Municipality**

**Associated Beneficiary(ies):**
Continental Reifen Deutschland
Ifsttar
Ipool S.r.l.
University of Reggio Calabria
Vie en.ro.se Ingegneria S.r.l

Eurocities Environment Forum
Oslo 23-25 Ottobre 2019

*Arnaldo Melloni*
*Project Manager*



# LIFE 18 ENV and GIE Welcome meeting in Brussels

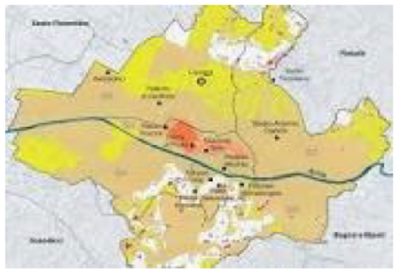
Issued on: November 2019

By: Comune di Firenze

MEETING


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

**PROJECT LOCATION: Florence Italy**



**BUDGET INFO:**

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Ifsttar
Ipool S.r.l.
University of Reggio Calabria
Vie en.ro.se Ingegneria S.r.l

*LIFE18 ENV and GIE Welcome Meeting, Brussels, 7-8 November 2019*

*Arnaldo Melloni*
*Project Manager*

# Development and launch of LIFE E-VIA website

**Issued on: December 2019**

**By: Vie en.ro.se. Ingegneria**

Deadline: 01/12/2019

**LIFE E-VIA WEBSITE**

Code: 3


https://life-evia.eu/

# SC4Life- SmartCity 360°
# Scientific Contribution

**Issued on: December 2019**

**By: UNIRC**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_1

SC4Life | EAI COMMUNITY THAT BUILDS YOUR CAREER — Collaborative research. Objective evaluation. Fair recognition.

HOME REGISTRATION COMMITTEES PROGRAM FOR AUTHORS CALLS PRACTICAL INFO SPONSORSHIP SMARTCITY 360°

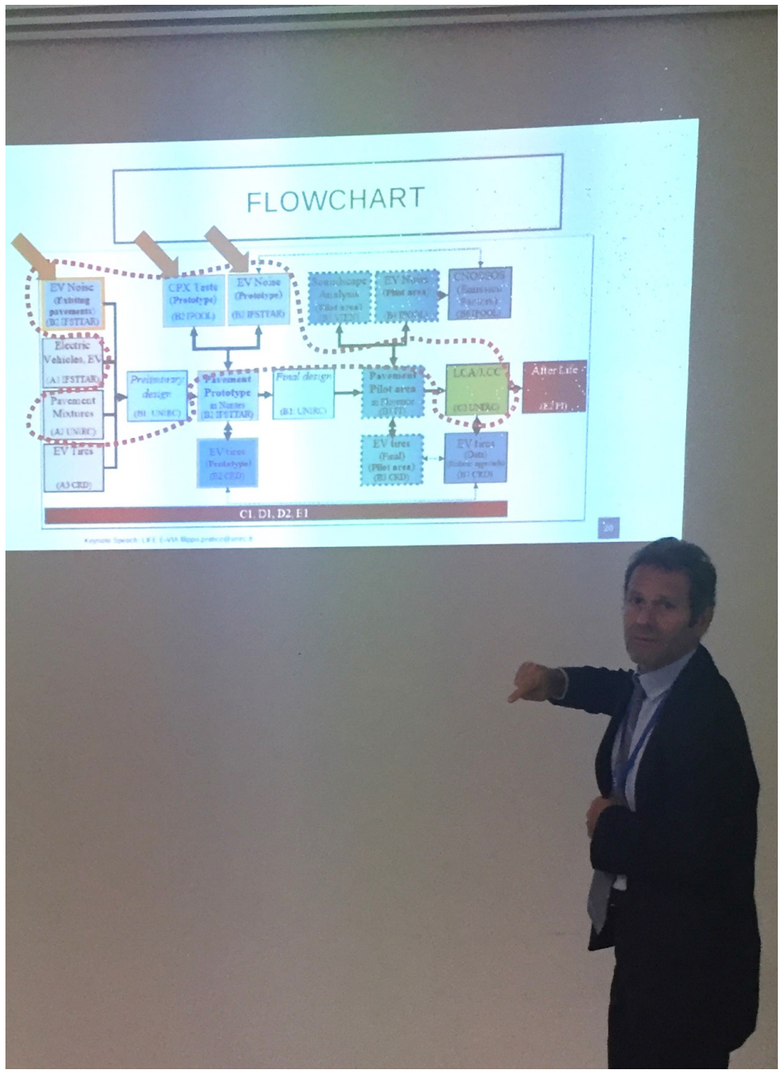
http://sc4life.org/full-program/

**SESSION 1**: Cities and Territory

Session Chair: Paulo Pereira

**Keynote Speech: Fillipo Pràtico**

Title: *LIFE E-VIA: Electric Vehicle noise control by assessment and optimisation of tyre/road interaction*




SC4Life conference will take place on the 5th December in the room #3
**11:30 – 13:00 SESSION 1**: Cities and Territory
Session Chair: Paulo Pereira

## Keynote Speech
## The LIFE E-VIA project

**Electric Vehicle noise control by assessment and optimisation of tyre/road interaction**
**(LIFE18 ENV/IT/000201)**

http://life-evia.eu http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=7210

Filippo Giammaria Praticò,
University Mediterranea of Reggio Calabria; Italy
filippo.pratico@unirc.it

SC4Life SmartCity360° THE GATEWAY TO INNOVATION UM CITIES University of Minho

# Paper published on Sustainability 2020 about the sustainable pavement materials for the urban roads.

**Issued on: January 2020**

**By: UNIRC**

Deadline: 31/12/2022

**ARTICLES FOR OPEN ACCESS JOURNAL**

Code: 20_1

https://www.mdpi.com/2071-1050/12/2/704/htm/

*sustainability*

MDPI

*Article*

## Energy and Environmental Life Cycle Assessment of Sustainable Pavement Materials and Technologies for Urban Roads

**Filippo G. Praticò [1], Marinella Giunta [2,*], Marina Mistretta [3] and Teresa Maria Gulotta [4]**

1 Department of Information, Infrastructure and Sustainable Energy (DIIES), Via Graziella, Feo di Vito, University Mediterranea of Reggio Calabria, 89214 Reggio Calabria, Italy; filippo.pratico@unirc.it

2 Department of Civil, Energy, Environmental and Material Engineering (DICEAM), via Graziella, Feo di Vito, University Mediterranea of Reggio Calabria, 89100 Reggio Calabria, Italy

3 Department of Heritage, Architecture, Urbanism (PAU), Via dell'Università, 25, University Mediterranea of Reggio Calabria, 89124 Reggio Calabria, Italy; marina.mistretta@unirc.it

4 Department of Engineering, Viale delle Scienze, University of Palermo, 90128 Palermo, Italy; teresa.gulotta@deim.unipa.it

* Correspondence: marinella.giunta@unirc.it; Tel.: +39-0965-169-2471

Received: 18 December 2019; Accepted: 16 January 2020; Published: 18 January 2020

check for updates

**Abstract:** Recycled and low-temperature materials are promising solutions to reduce the environmental burden deriving from hot mix asphalts. Despite this, there is lack of studies focusing on the assessment of the life-cycle impacts of these promising technologies. Consequently, this study deals with the life cycle assessment (LCA) of different classes of pavement technologies, based on the use of bituminous mixes (hot mix asphalt and warm mix asphalt) with recycled materials (reclaimed asphalt pavements, crumb rubber, and waste plastics), in the pursuit of assessing energy and environmental impacts. Analysis is developed based on the ISO 14040 series. Different scenarios of pavement production, construction, and maintenance are assessed and compared to a reference case involving the use of common paving materials. For all the considered scenarios, the influence of each life-cycle phase on the overall impacts is assessed to the purpose of identifying the phases and processes which produce the greatest impacts. Results show that material production involves the highest contribution (about 60–70%) in all the examined impact categories. Further, the combined use of warm mix asphalts and recycled materials in bituminous mixtures entails lower energy consumption and environmental impacts due to a reduction of virgin bitumen and aggregate consumption, which involves a decrease in the consumption of primary energy and raw materials, and reduced impacts for disposal. LCA results demonstrate that this methodology is able to help set up strategies for eco-design in the pavement sector.



all the scenarios. In detail, it accounts for more than 60% of the majority of environmental indicators, with the exception of $EF_w$, HT-ce, HT-nce, and ME.

The negative values of Ftox and HT-ce in Scenario 1 (addition of waste plastics in the bituminous mixture) are essentially due to the avoided impacts of virgin plastics.

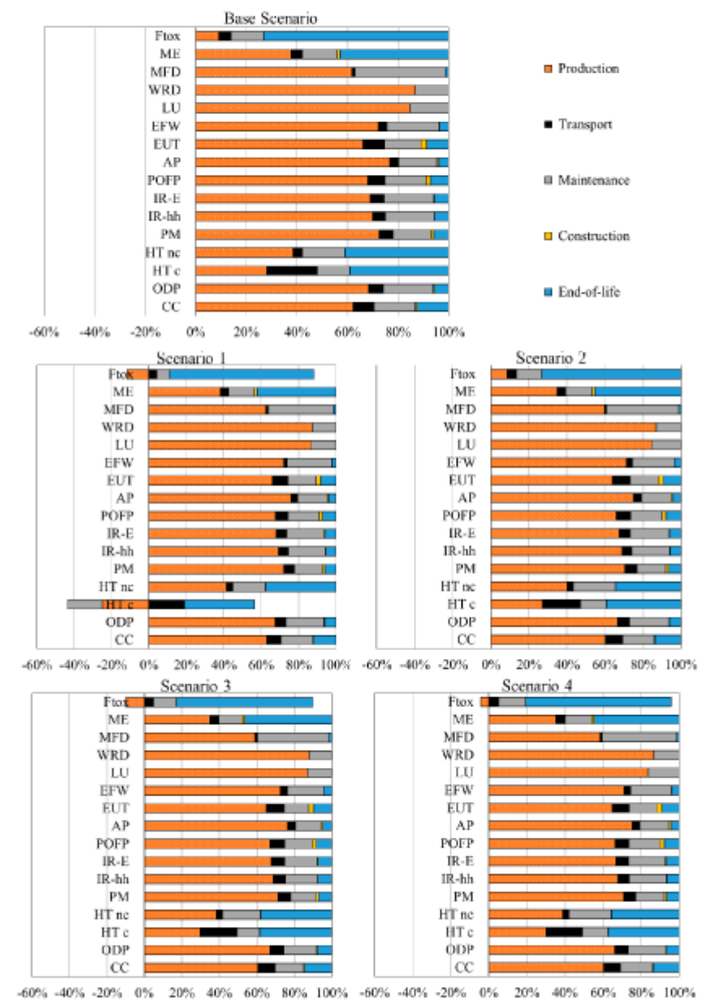



**Figure 2.** Contribution analysis of life-cycle environmental impacts.

# LIFE E-VIA: objectives and actions

**Issued on: February 2020**

**By: : Vie en.ro.se. Ingegneria**

Deadline: 01/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_1

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

***Background***

Exposure data from the European Environment Agency (EEA) demonstrate that more than 100 million EU citizens are affected by high noise levels negatively impacting human health. Traffic noise alone is harmful to the health of almost every third person in the WHO (World Health Organization) European Region. 20% of Europeans are regularly exposed to night sound levels that could significantly damage health, especially in urban areas. As emerged in Noise in Europe Conference (April 2017) and in the WHO guidelines published in October 2018, the increased stringency of EU at source standards needs to be balanced against other effective measures such as road surface and/or tyre improvements and urban planning measures as well.
One of the solutions universally recognized as the best to reduce noise in urban areas, from both the point of view of noise and air quality, is the introduction of **electric mobility**. Thus, for the changed requirements of Electric Vehicles (EVs) there is a need for in-depth investigations of tyre/road interaction. Last but not least, even for the application of the Directive 2002/49/EC, the coefficients to apply the CNOSSOS model (Directive 996/2015/EC) to new traffic spectra and new vehicles are completely missing.

***Objectives***

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 5 different EV types, one reference ICE Vehicle (ICEV) and at least 3 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 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
4. To 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. Calabria Region and Città of Reggio Calabria also expressed their interest.
5. 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.
6. 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
7. To **encourage low-noise surfaces implementation in further EU and extra-EU scenarios**, demonstrating durability and sustainability, through in-depth LCA&LCCA

***Actions***

**A. Preparatory actions**
A1 Electric vehicles and their noise emission
A2 Quiet pavement technologies and their performance over time
A3 Tyre role in the new context of EV and ICEV

**B. Implementation actions**
B1 Tracks design
B2 Tyre-pavement coupling study and prototype implementation
B3 Pilot area: Implementation, Replication and transferability
B4 Track efficiency tests in the pilot area
B5 Soundscape analysis
B6 Evaluation of EV noise emissions
B7 Holistic performances of tyres

**C. Monitoring of the impact of the project actions**
C1 Monitoring of the impact of the project actions
C2 Life cycle analysis (LCA) and life cycle costing (LCC)

**D. Public awareness and dissemination of results**
D1 Information and awareness raising activities
D2 Technical dissemination activities to stakeholders

**E. Project management**

***Stakeholders***


Project website: https://life-evia.eu/

**Roll-up**

**Issued on: February 2020**

**By: : Vie en.ro.se. Ingegneria**

Deadline: 01/12/2022

With the contribution of the LIFE programme of the European Union
**LIFE18 ENV/IT/000201**

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_2

# LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by
**A**ssessment and optimisation
of tyre/road interaction

Coordinating beneficiary

Partners

# Journées Techniques Acoustique et Vibrations

## "LIFE E-VIA: noise control of electric vehicles by optimizing tire-road interaction"

**Issued on: March 2020**

**By: : Université Gustave Eiffel**

Deadline: 31/01/2023

**SCIENTIFIC PRESENTATION IN NATIONAL CONGRESS**

Code: 36_2

Journées Techniques
Acoustique et Vibrations
Lille – France – 11-12 mars 2020

JOURNEES TECHNIQUES ACOUSTIQUE ET VIBRATIONS

### LIFE E-VIA : contrôle du bruit des véhicules électriques par optimisation de l'interaction pneumatique-chaussée

Julien CESBRON, Marie-Agnès PALLAS, Philippe KLEIN,
Simon BIANCHETTI, Adrien LE BELLEC, Vincent GARY

Université Gustave Eiffel – UMRAE

Université Gustave Eiffel  Cerema

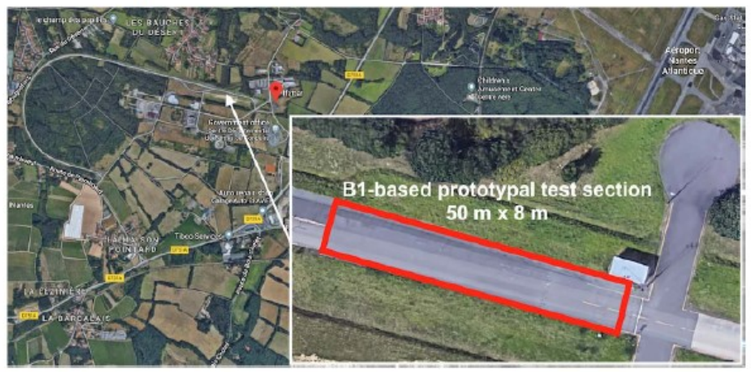
## Action B21 - Acoustical characterization of EVs

- Planned vehicles:
  - One ICE Vehicle (Renault Kangoo Diesel)
  - Several EVs (Renault Kangoo ZE, Renault Zoe, C-Zero, Nissan Leaf, BMW i3, Tesla Model 3)
- Already tested in August 2019:
  - Renault Kangoos (ICEV and EV) and Renault Zoe



## Action B22 – Prototype construction

- Construction of a B1-based test track prototype:
  - Located on IFSTTAR reference test track in Nantes
  - Call for tender planned in April 2020 based on B1 recommendations
  - Construction planned in July 2020






*11th International Conference "Environmental Engineering"*
*Vilnius Gediminas Technical University*
*Lithuania, 21–22 May 2020*
*Section: Environmental Protection and Water Engineering*
*http://enviro.vgtu.lt*

eISSN 2029-7092 / eISBN 978-609-476-232-1

Article ID: enviro.2020.622
https://doi.org/10.3846/enviro.2020.622

# Particulate Matter from Non-exhaust Sources

Filippo G. Praticò, Paolo G. Briante*

*Department of Information Engineering, Infrastructure and Sustainable Energy (DIIES), Mediterranea University, Reggio Calabria, Italy*

Received 04 February 2020; accepted 24 March 2020

**Abstract.** Air pollution is an important issue worldwide. Solid components in air (particulate matter, PM) originate from a variety of natural or anthropogenic sources and have different morphological, physical, and chemical properties. Their presence in the air also depends on meteorological conditions, such as humidity, rainfall, and wind speed. PM pollution has adverse effects on environment and human health. Therefore, it is very important to address sources and processes involved in PM generation. Among the existing sources, a special attention must be paid to PM emissions from road traffic, i.e., exhaust sources (e.g., fuel combustion) and non-exhaust sources (e.g., road, tyre, brakes). These traffic-related sources contribute to PM concentrations in cities, and this calls for research into new possible systems and/or mitigation measures. In light of the facts above, the objectives of this study are 1) To evaluate the contribution to PM emission from traffic-related sources. 2) To evaluate existing mitigation measures and to identify new ones to reduce PM production. First results show that: 1) Non-exhaust sources have a different role in PM generation and they differently affect $PM_{10}$, $PM_{2.5}$, and $PM_{0.1}$. 2) Even if emissions-related regulations have led to reductions in exhaust emissions from road traffic, other mitigation measures could reduce the non-exhaust part of emissions (e.g., brakes wear, road wear, and tyre wear). 3) New technologies could be developed to reduce PM from non-exhaust sources.

**Keywords:** particulate matter, non-exhaust sources, tyre wear, road wear, brake wear, mitigation measures.

Paper submitted to 4th International Symposium "NEW METROPOLITAN PERSPECTIVES", Reggio Calabria, Italy.
Issued on: May 2020
By: UNIRC
Deadline: 31/01/2023

SCIENTIFIC PAPERS
Code: 36_4



# Smart Road Infrastructures Through Vibro-Acoustic Signature Analyses

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**Abstract.** Smart cities need "intelligent" infrastructures designed or managed bearing in mind crucial characteristics, such as sustainability, efficiency, safety, and resiliency. Several solutions can be adopted, but the key factor for the success of the solution selected is its ability of improving the management process. The objective of the study described in this paper is to develop a solution that can be used to make smarter the road pavement monitoring and maintenance. In particular, a Non-Destructive Test (NDT)-based method is presented and applied aiming at extracting crucial information about the Structural Health Status (SHS) of the monitored road pavement. Results show that the method is able to recognize the presence and the growing of induced cracks using meaningful features extracted from the vibro-acoustic signatures (acoustic signals) of the road pavement loaded by a light vehicle. The above-mentioned features can be used to build innovative P-F curves able to improve the road pavement management process.

**Keywords:** Smart roads · Sustainability · Vibro-acoustic signature

**Paper submitted to the 20th IEEE Mediterranean Elettronical Conference (MELECON), Palermo, Italy.**
**Issued on: June 2020**
**By: UNIRC**
Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_5

# Acoustic Impact of Electric Vehicles

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0000-0002-2018-0198

***Abstract*— Electric vehicles (EV) diffusion depends on many factors among which policies, people options, and economic factors. Their noise-related performance could appear favourable. This notwithstanding, despite partisan opinions, the analyses carried out suggest that research and industry will have to minimise the collateral issues posed by a quite probable EV diffusion. The objective of the study presented in this paper is to analyse the acoustic impact of electric vehicles (EV) and to set up an overall framework for an effective management of their diffusion. After the objectives, EV overall characteristics are analysed. EV acoustic performance are then analysed. In the final discussion, the main characteristics of the required holistic approach are highlighted. This can benefit both researchers and practitioners.**

***Keywords*— *Electric Vehicle, Noise, Surface Properties, Environmental Impact***

Paper submitted to Forum Acusticum Congress "LIFE E-VIA project: noise, electric vehicles and tyres".
Issued on: November 2020
By: Comune di Firenze, Vie en.ro.se. Ingegneria
Deadline: 31/01/2023

SCIENTIFIC PAPERS
Code: 36_6

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

**Arnaldo Melloni[1] Gessica Pecchioni[1] Sergio Luzzi[2] Raffaella Bellomini[2]**
[1] Comune di Firenze, Firenze, Italy
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gessica.pecchioni@comune.fi.it

**ABSTRACT**

The LIFE E-VIA project tackles noise pollution from road traffic noise focusing on a future perspective in which electric and hybrid vehicles will be a consistent portion of traffic flow. Others main objectives of the project consist in: the combination of knowledge of road optimization and tyre development in order to test an optimized solution for reducing noise in urban areas and Life Cycle Cost with respect to actual best; the noise reduction for roads inside very populated urban areas through the implementation of a mitigation measure aimed at optimizing road surfaces and tyres of EVs (electric vehicles). From a practical point of view, two road surfaces, and at least five different EVs (including tyres specifically designed for EVs) will be tested. Finally, the soundscape holistic approach will be used to evaluate the performance of EV vs ICEV in the newly built scenario.

LIFE18 ENV/IT/000201
With financial support from the EU LIFE programme

e-Forum Acusticum 2020
Dec 7-11, 2020

COMUNE DI FIRENZE
Vie en.ro.se. Ingegneria

**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*

IYS2020 Steering Committee Meeting
16 January 2021

**Student competition and Italian events**
State of the Art

Sergio Luzzi
Chiara Bartalucci

# Promotion – EU Projects

**LIFE18 ENV/IT/000201** Electric Vehicle noise control by Assessment and optimization of tyre/road interaction
2019- ongoing
*Organization of a student contest for high schools and music academy teachers/students to develop a proposal for the optimal "EV sound" (low-speed issue).*

1

**Creative Europe AURA** Auralisation of acoustic heritage sites using Augmented and Virtual Reality
2021-ongoing
With the project AURA, music and opera houses in Berlin, Florence and Lviv – supported by tech and marketing partners – strive to tap into the potentials that auralisation opens up for music performing arts and establishments. Three use cases will show auralisation experiences with 3D-models of the music venues, creating perfect replica and producing exciting new ways of experiencing music.

**Other EU/International projects about “positive sound” to be related to IYS?**

9

# Articles published on Italian journals

## Issued on: March 2021

**NETWORKING ACTIVITIES**

Arpatoscana
30 marzo alle ore 09:30 ·

A #Firenze, nell'estate 2021, grazie al Progetto europeo LIFE E-VIA, si sperimenterà con un progetto pilota la riduzione del #rumore da #traffico in una strada densamente abitata e trafficata della città.

Il progetto prevede la stesa di asfalto a bassa emissione di rumore e la realizzazione di test legati alla durabilità dell'asfalto.

Per saperne di più: http://www.arpat.toscana.it/.../life-e-via-un-progetto..... **Altro...**

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ARPAT
Agenzia regionale per la protezione ambientale della Toscana

INSIEME PER UN FUTURO SOSTENIBILE

Sistema Nazionale per la Protezione dell'Ambiente

REGIONE TOSCANA

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ARPAT NEWS giornaliero

Martedì 30 marzo 2021

### *LIFE E-VIA: un progetto europeo per città meno rumorose*

Share | Tweet

*Tra gli obiettivi principali del progetto la riduzione del rumore da traffico stradale all'interno di aree urbane molto popolate attraverso l'ottimizzazione di superfici stradali e degli pneumatici dei veicoli elettrici. Il caso pilota sarà realizzato in una strada densamente abitata e trafficata della città di Firenze con la stesa di asfalto a bassa emissione di rumore e test legati alla durabilità dell'asfalto*

**Notizie**
- Schiume sul Torrente Resco a Reggello (FI)
- Le attività di laboratorio ARPAT nel triennio 2017-2019
- M'illumino di meno promuove il salto di specie
- Distilleria Deta: sopralluogo ARPAT a seguito di numerose segnalazioni di cattivi odori

**Dati e Mappe**
- Dati del controllo dei campi elettromagnetici (CEM) ad alta frequenza
- Concentrazione di attività alfa totale, beta totale e radon-222 in acqua destinata al consumo umano - anni 2015-2017 e 2019
- Concentrazione di cesio-137 nelle acque superficiali - anni 2011-

**Documentazione**
- Relazione sull'attività dei laboratori ARPAT - anno 2019
- La Marine Strategy in Toscana
- Il controllo dei depuratori di acque reflue urbane nel 2019
- Piano delle azioni positive 2020 - 2022

**ARPAT** @arpatoscana · 30 mar

I progetto @LIFEEVIA1 ha l'obiettivo di ridurre il #rumore da traffico stradale in città. #Firenze - che coordina il progetto - ospiterà il caso pilota: in una strada di S.Jacopino verrà steso asfalto a bassa emissione e ne sarà valutata efficacia/durata arpat.toscana.it/notizie/arpatn...

# Articles published on Italian journals

**Issued on: April 2021**

**NETWORKING ACTIVITIES**

la Repubblica FIRENZE

Dir. Resp.: Maurizio Molinari

Tiratura: 0 - Diffusione: 14521 - Lettori: 109000: da enti certificatori o autocertificati

*Via Paisiello*

## L'esperimento dell'asfalto che riduce i rumori del traffico

Ridurre il rumore del traffico nelle strade urbane grazie a un nuovo asfalto
È l'obiettivo
E-Via, che ve
pofila e caso
mentazione:
ra steso dura
Paisiello a Sa
test sulle pres
dividuate alt
sperimentazi
per la diffusio
ropa. «Grazi
che come dir
siamo aggiud
no - spiega
biente Cecili
dare il via all
del nuovo as
per contribui
namento acu
bane». «Partia
tà da ripristin
giunge l'asse
Stefano Gior
asfalto che ri
venienti dalla
do asfalto e p
dei mezzi che

LA NAZIONE FIRENZE

Dir. Resp.: Agnese Pini

Tiratura: 0 - Diffusione: 19762 - Lettori: 139000: da enti certific

## Asfalto silenzi
## La sperimenta
## parte da via Pa

Anche i cittadini dovranno esprimere le p
Poi saranno scelte altre aree della città d

FIRENZE

**Ridurre il rumore** del traffico nelle strade urbane grazie a un nuovo asfalto a bassa emissione. E' l'obiettivo del progetto europeo *Life E-Via*, che vede Firenze città capofila e caso pilota per la sperimentazione: il nuovo asfalto sarà steso durante l'estate in via Paisiello a San Jacopino. Dopo i test sulle prestazioni, saranno individuate altre tre aree per la sperimentazione in città e poi per la diffusione in Italia e in Europa. «Grazie al progetto *Life* che come Direzione Ambiente ci siamo aggiudicati lo scorso anno – ha detto l'assessore all'Ambiente Cecilia Del Re – possiamo dare il via alla sperimentazione del nuovo asfalto antirumore per contribuire a ridurre l'inquinamento acustico nelle aree urbane. Partiremo da via Paisiello per poi individuare altre aree analoghe e verificare i risultati della sperimentazione con l'obiettivo di rendere Firenze più confortevole dal punto di vista acustico. I progetti europei sono una grandissima opportunità per innovare gli strumenti di intervento e dare risposte sempre più efficienti a temi urgenti e complessi come quelli ambientali».

«**Partiamo** da una viabilità da ripristinare e risanare – ha aggiunto l'assessore a
on Giorgetti –
che riduca i r
dalla strada o
to e pneumati
zi che transita
**Il progetto** *L*
inoltre il coinv
tadini attraver
formazione su
mi della mobilità elettrica e sostenibile, ma anche attraverso passeggiate sonore e interviste per capire come cambia la percezione del rumore al variare della tipologia di asfalto e di veicoli e pneumatici. Le interviste saranno realizzate anche su autobus e taxi elettrici coinvolti nell'iniziativa. L'implementazione del caso pilota nella città di Firenze è prevista durante l'estate 2021, in via Paisiello. Il Progetto *Life E-Via* affronta il tema dell'inquinamento acustico dovuto al rumore del traffico stradale, concentrandosi su una prospettiva futura in cui i veicoli elettrici e ibridi saranno una parte consistente del flusso di traffico. L'obiettivo è ottimizzare asfalti e pneumatici per ridurre il rumore nelle aree urbane. Il Progetto, co-finanziato dall'Unione europea attraverso il programma *Life*, ha avuto inizio a luglio 2019 e terminerà a gennaio 2023.

## Asfalto anti rumore a Firenze, collabora l'Università Mediterranea

*L'ateneo di Reggio Calabria tra i partner del progetto Life E-Via. Sperimentazione per ridurre l'inquinamento acustico*

Pubblicato il: 04/04/2021 – 9:17

**FIRENZE** Ridurre
asfalto a bassa e
città capofila e ca
durante l'estate i

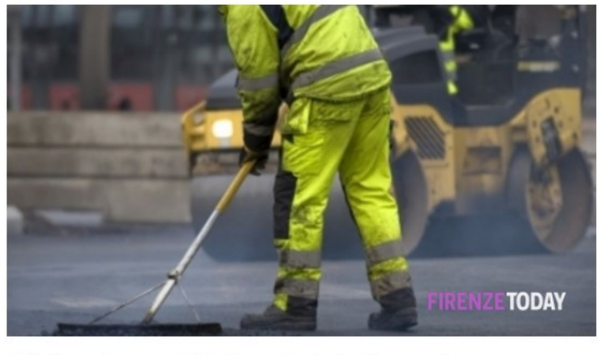
FIRENZETODAY ≡ Sezioni life

life

## San Jacopino: arriva l'asfalto anti rumore: Firenze città pilota in Europa per la sperimentazione

Si parte in estate da via Paisiello per poi estendere il progetto ad altre aree

FT Redazione
05 APRILE 2021 10:45

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1 San Jacopino: arriva l'asfalto anti rumore: Firenze città pilota in Europa per la sperimentazione

Ridurre il rumore del traffico nelle strade urbane grazie a un nuovo asfalto a bassa emissione. E' l'obiettivo del progetto Life E-Via, che vede Firenze città capofila e caso pilota per la sperimentazione: il nuovo asfalto sarà steso durante l'estate in via Paisiello a San Jacopino. Dopo i test sulle prestazioni, saranno individuate altre tre aree per la sperimentazione in città e poi per la diffusione in Italia e in Europa.

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e sperimenta un asfalto in grado
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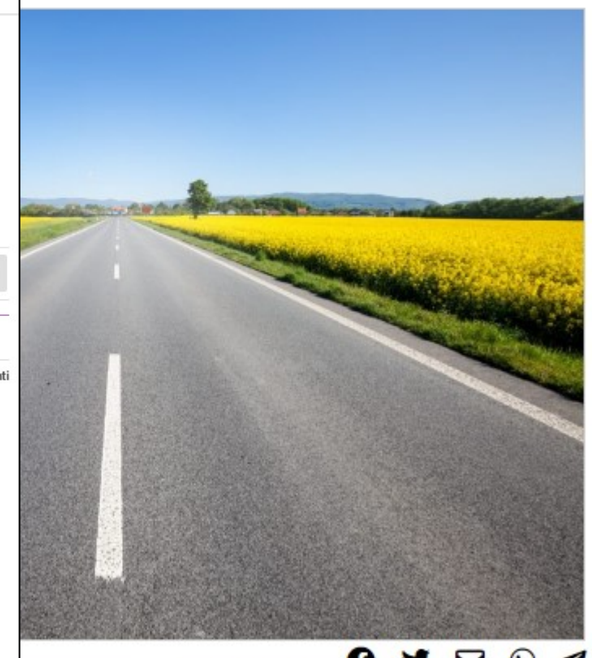

Condividi l'articolo:

## Asfalto anti rumore, Firenze lo testa per l'Europa

Mi piace 15 Condividi Tweet Condividi

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pneumatici. Le interviste saran

Il Progetto, co-finanziato dall'U
2019 e terminerà a gennaio 202
partner l'Università Mediterran
Gustave Eiffel e I-Pool.

## A San Jacopino arriva l'asfalto anti rumore

Si parte in estate da via Paisiello. Consolidamento di un muro in via Bolognese, ri-pavimentazione in via di Castelnuovo

Redazione Nove da Firenze
03 aprile 2021 16:20

## Arriva l'asfalto anti rumore, Firenze città pilota in Europa per la sperimentazione

Si parte in estate da via Paisiello a San Jacopino per poi estendere il progetto ad altre aree

ANSA2030

## Asfalto anti rumore, Firenze città pilota in Europa

Per sperimentazione progetto Life E-Via dalla prossima estate

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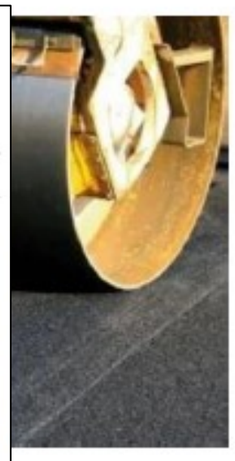

nelle strade urbane
o del progetto Life E-
a sperimentazione: il
San Jacopino.

# La Martinella
Un altro modo di raccontare Firenze

HOME | ATTUALITÀ E POLITICA | ARTE E CULTURA | SOCIALE | INCHIESTE | INTERVENTI | IL PUNTO DEL DIRETTORE | SPORT | SPETTACOLI

Life E-via

## A S. Jacopino arriva l'asfalto anti rumore:

3 APRILE 2021 // La Martinella Di Firenze

Firenze città pilota in Europa per la sperimentazione del progetto Life E-via. Si parte in estate da via Paisiello per poi estendere il progetto ad altre aree

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Il Punto Del Direttore

# Press release: "A San Jacopino arriva l'asfalto anti rumore: Firenze città pilota in Europa per la sperimentazione"

**Issued on: April 2021**

**By: Comune di Firenze**

Deadline: 31/07/2022

**PRESS CONFERENCES**

Code: 11_a

Il Comune Servizi Ambiente Cultura Educazione Tutti gli argomenti

## A San Jacopino arriva l'asfalto anti rumore: Firenze città pilota in Europa per la sperimentazione

ambiente

03 aprile 2021

Si parte in estate da via Paisiello per poi estendere il progetto ad altre aree

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https://www.comune.fi.it/comunicati-stampa/san-jacopino-arriva-lasfalto-anti-rumore-firenze-citta-pilota-europa-la

# LIFE E-VIA: objectives and actions (IT)

**Issued on: May 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_1

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

***Background***

I dati sull'esposizione dell'Agenzia europea dell'ambiente (EAA) dimostrano che più di 100 milioni di cittadini dell'UE sono esposti ad elevati livelli di rumore che hanno un impatto negativo sulla salute umana. Il solo rumore del traffico stradale è dannoso per la salute di quasi una persona su tre nella regione europea dell'OMS (Organizzazione Mondiale della Sanità). Il 20% dei cittadini europei è regolarmente esposto a livelli sonori notturni che potrebbero danneggiare significativamente la loro salute, soprattutto nelle aree urbane. Come emerso nella conferenza Noise in Europe (aprile 2017) e nelle linee guida dell'OMS pubblicate nell'ottobre 2018, la maggiore severità delle norme UE riferite alla sorgente di rumore deve essere bilanciata con altre misure efficaci come il miglioramento della superficie stradale e/o dei pneumatici e anche misure di pianificazione urbana. Una delle soluzioni universalmente riconosciute come la migliore per ridurre il rumore nelle aree urbane, sia dal punto di vista del rumore che della qualità dell'aria, è l'introduzione della **mobilità elettrica**. Quindi, per le mutate esigenze dei veicoli elettrici (EV) c'è bisogno di indagini approfondite sull'interazione pneumatico/strada. Infine, anche per l'applicazione della direttiva 2002/49/CE, risultano attualmente assenti i coefficienti necessari per applicare il modello CNOSSOS (Direttiva 996/2015/CE), in riferimento ai nuovi spettri di traffico e ai nuovi veicoli.

***Obiettivi***

1. **Ridurre il rumore da traffico stradale** all'interno di aree urbane densamente abitate, attraverso l'attuazione di una misura di mitigazione volta a **ottimizzare le superfici stradali e i pneumatici dei veicoli elettrici**. Saranno testati due superfici stradali, almeno 5 diversi tipi di EV, un veicolo con motore a combustione interna di riferimento (ICEV) e almeno 3 tipi di pneumatici per tipo di veicolo (compresi i pneumatici specificamente progettati per EV).
2. **Stimare l'efficienza e il potenziale di mitigazione di pneumatici, asfalti e traffico** (spettro di traffico, velocità, condizioni di movimentazione) ad un livello più alto e completo: saranno eseguite un'analisi del ciclo di vita (**LCA**) e un'analisi dei costi del ciclo di vita (LCCA) per dimostrare l'efficienza individuale e sinergica di superfici, pneumatici e veicoli (incluso il confronto tra veicoli a combustione interna, traffico misto e traffico EV).
3. Contribuire all'**effettiva implementazione della legislazione UE** (Direttive UE 2002/49/CE e 2015/996/CE), fornendo coefficienti di rumore di rotolamento all'interno del metodo comune di valutazione del rumore (**CNOSSOS-EU**), specificamente per i veicoli elettrici, per i quali i professionisti, le agenzie e i dipartimenti che mirano a sviluppare scenari futuri necessitano di dati.
4. Contribuire alle **politiche nazionali e regionali italiane**, emettendo **linee guida** sull'uso e l'applicazione della metodologia prodotta dal progetto, che sarà adottata, attraverso l'Agenzia Regionale per l'Ambiente (ARPAT) e la Regione Toscana. Anche la Regione Calabria e la Città di Reggio Calabria hanno espresso il loro interesse.
5. **Sensibilizzare le persone sull'inquinamento acustico e sugli effetti di quest'ultimo sulla salute**, spiegando le opportunità offerte dai veicoli elettrici attraverso specifici eventi divulgativi e promozionali, indagando anche la percezione delle persone riguardo al rumore in termini di paesaggio sonoro e coinvolgendole nell'acquisizione dei dati sul rumore.
6. Dimostrare e promuovere la **mobilità sostenibile del trasporto su strada (mobilità elettrica)**, riducendo l'emissione di rumore di 5 dB(A) in corrispondenza dei ricettori a bordo strada e raggiungendo anche la riduzione delle emissioni di CO2 (21%), sulla base del contesto italiano (GPL, CNG, Hybrid, EV, auto a benzina, auto diesel) e la letteratura in materia.
7. **Incoraggiare l'implementazione di superfici a bassa rumorosità in ulteriori scenari UE ed extra-UE**, dimostrando durata e sostenibilità, attraverso un'approfondita LCA&LCCA.

***Azioni***

**A. Azioni preparatorie**
A1 Veicoli elettrici e la loro emissione di rumore
A2 Pavimentazione a bassa emissione di rumore e performance nel tempo
A3 Ruolo dei pneumatici nel nuovo contesto di EV e ICEV

B. **Azioni implementative**
B1 Progettazione degli asfalti
B2 Studio dell'accoppiamento pneumatico-pavimentazione e realizzazione del prototipo
B3 Area pilota: Attuazione. Replicazione e trasferibilità
B4 Test di efficienza dell'asfalto nell'area pilota
B5 Analisi del paesaggio sonoro
B6 Valutazione delle emissioni acustiche dei veicoli elettrici
B7 Prestazioni olistiche dei pneumatici

C. **Monitoraggio dell'impatto delle azioni del progetto**
C1 Monitoraggio dell'impatto delle azioni del progetto
C2 Analisi del ciclo di vita (LCA) e calcolo dei costi del ciclo di vita (LCC)

D. **Sensibilizzazione del pubblico e diffusione dei risultati**
D1 Attività di informazione e sensibilizzazione
D2 Attività di divulgazione tecnica alle parti interessate

**E. Project management**

***Stakeholders***


Sito web: https://life-evia.eu/

# LIFE E-VIA: objectives and actions (DE)

**Issued on: May 2021**

**By: : Continental**

Deadline: 31/12/2022

**NOTICEBOARD IN GERMAN LANGUAGE**

Code: 22_1

LIFE18 ENV/IT/000201

Mit Unterstützung des LIFE-Förderprogramms der Europäischen Union

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

***Hintergrund***

Belastungsdaten der Europäischen Umweltagentur (EEA) zeigen, dass mehr als 100 Millionen EU-Bürger durch gesundheitsbelastende Geräuschpegel beeinträchtigt sind. Laut Weltgesundheitsorganisation (WHO) ist dabei in etwa jede dritte Person in der Europäischen Region Verkehrslärm ausgesetzt, der ungesund ist. 20 % aller Europäer, insbesondere in urbanen Gebieten, sind regelmäßig nächtlichen Schalldruckpegeln ausgesetzt, die gesundheitsschädlich sein können. Wie in der *Noise in Europe Conference* (April 2017) und den WHO Richtlinien (Okt. 2018) ausgeführt wird, müssen EU-Regeln zur Schallquellennormierung auch mit weiteren effektiven Maßnahmen wie Verbesserungen an Straßenoberflächen oder Reifen, und städtebaulichen Maßnahmen kombiniert werden.
Eine Maßnahme, die allgemein als der beste Ansatz zur Geräuschreduzierung und Minimierung gesundheitsschädlicher Luftverschmutzungen im städtischen Umfeld angesehen wird, ist die Einführung der Elektromobilität. Aufgrund der im Vergleich zu klassischen Verbrennungsfahrzeugen geänderten Eigenschaften von Elektrofahrzeugen (EV) gibt es einen Bedarf zur Untersuchung der Reifen-/Fahrbahninteraktion. Weiterhin fehlen, selbst unter Berücksichtigung der Richtlinie 2002/49/EC, entsprechende Koeffizienten, um das CNOSSOS-Model (Richtlinie 996/2015/EC) für die neuen Fahrzeugtypen und Geräuschspektren anwenden zu können.

***Ziele***

1. Eine Lärmreduzierung für dichtbesiedelte urbane Gebiete durch die Implementierung von Minderungsmaßnahmen die auf **optimierte Straßenbeläge und Reifen für EVs** abzielen. Zwei Straßenoberflächen, mindestens fünf verschiedene Elektrofahrzeuge, ein Referenzfahrzeug mit Verbrennungsmotor und mindestes drei verschiedene Reifen pro Fahrzeugklasse (inkl. spezieller EV-Reifen) werden getestet
2. Eine Abschätzung der **Minderungseffektivität und -potentials** von **Reifen**, **Fahrbahnbelägen** und **Verkehrseigenschaften** (z.B. Verkehrsspektren, Geschwindigkeiten, Fahrweisen) auf einem höheren Verständnisniveau: Lebenszyklus-/Lebenszykluskostenanalyse (**LCA** und **LCCA**) werden durchgeführt um die individuelle und synergetische Effizienz verschiedener Fahrbahnbeläge, Reifen und Fahrzeugen zu zeigen, inkl. eines Vergleichs zwischen reinem Verbrennungs-, Misch- und reinem EV-Verkehr).
3. Beizutragen zur **effektiven Umsetzung von EU-Gesetzgebung** (EU Richtlinien 2002/49/EC und 2015/996/EC) durch die Bereitstellung von speziell für elektrische Fahrzeuge angepasste Rollgeräusch-Koeffizienten für die Common Noise Assessment Methode (**CNOSSOS-EU**). Dies ermöglicht beratenden, planenden und umsetzenden Personen und Organisationen die Betrachtung zukünftiger Szenarien.
4. Beizutragen zur **National-** und **Regionalpolitik** durch die Herausgabe von **Richtlinien** und **Empfehlungen** zur Nutzung und Anwendung der Projektergebnisse. In Kollaboration mit dem Projekt wird beispielsweise durch die regionale Umweltbehörde der Toskana (ARPAT) geschehen. Weitere italienische Kommunen und Regionen haben ebenfalls ihr Interesse bezeugt.
5. Eine **Verbesserung des öffentlichen Bewusstseins** für schädliche Geräuschbelastungen, die daraus resultierenden Gesundheitsgefahren und die damit zusammenhängenden Möglichkeiten der Elektromobilität, mittels zielgerichteter Informationskampagnen und -veranstaltungen, sowie einer Beteiligung der Bevölkerung durch Soundscape-Befragungen und einer der Einbeziehung in die Geräuschdatenerfassung..
6. Das **Demonstrieren** und **Bewerben** eines **nachhaltigen (elektrischen) Straßenverkehrs** durch Reduzierung der Schallbelastung um 5 dB(A) im Bereich der straßenzugewandten Außenfassade bei gleichzeitiger Reduzierung der $CO_2$-Emissionen um 21 % (Werte im Kontext der Gegebenheiten der italienischen Pilotanwendung und des Stands der entsprechenden Literatur)
7. Eine **Förderung** der **Nutzung geräuschoptimierter Straßenoberflächen** in entsprechenden Szenarien **innerhalb** und **außerhalb der EU** durch die Zuschaustellung der Haltbarkeit und Nachhaltigkeit entsprechender Lösungen mittels LCA und LCCA

***Maßnahmen***

**A. Vorbereitende Maßnahmen**
A1 Elektrofahrzeuge und ihre Geräuschemissionen
A2 Technologien für leise Fahrbahnbeläge und ihre zeitliche Leistungsfähigkeit
A3 Die Rolles des Reifens im neuen Kontext von Elektro- vs. Verbrennungsfahrzeugen

**B. Implementierungsmaßnahmen**
B1 Fahrbahnoberflächendesign
B2 Reifen-/Fahrbahninteraktionsstudie und Prototypimplementierung
B3 Pilotanwendung, Implementierung, Replikation und Transferierbarkeit
B4 Fahrbahneffizienztests im Rahmen der Pilotanwendung
B5 Soundscape-Analyse
B6 Auswertung von EV-Geräuschemissionen
B7 Holistische Leistungseigenschaften von Reifen

**C. Monitoring der Wirkung der Projektmaßnahmen**
C1 Monitoring der Wirkung der Projektmaßnahmen
C2 Lebenszyklusanalyse (LCA) und Lebenszykluskosten (LCC)

**D. Öffentliches Bewusstsein und Verbreitung der Ergebnisse**
D1 Informations- und Sensibilisierungsmaßnahmen
D2 Verbreitungsmaßnahmen and technische Interessengruppen

**E. Projektmanagement**

***Interessengruppen***


Projektwebsite: https://life-evia.eu/

# WEBINAR: ‘Mobilità elettrica e asfalti a bassa emissione di rumore: il progetto LIFE E-VIA e altri contributi’

**Issued on: May 2021**

**By: Comune di Firenze, Vie en.ro.se. Ingegneria, UNIRC**

**EVENTS**
Code: E_3

*LIFE/ENV/IT000201 LIFE E-VIA*
*Project co-funded by the European Commission into the LIFE+2018 Programme.*

COMUNE DI FIRENZE — Vie en.ro.se. Ingegneria — Università degli Studi Mediterranea di Reggio Calabria

**Con il patrocinio di**

Associazione Italiana di Acustica

organizzano il

**WEBINAR**

**Mobilità elettrica e asfalti a bassa emissione di rumore: il progetto LIFE E-VIA e altri contributi**

**14 maggio 2021 h 14.00-16.10**

In modalità online sulla piattaforma Microsoft Teams

**In collaborazione con**

HEAD acoustics — P.E.S.C.A.S. — ecopneus — nereide

**2 ore di aggiornamento per Tecnici Competenti in Acustica**

L’aggiornamento per i TCA è riservato ai primi 36 iscritti

Il corso è riconosciuto dalla Regione Toscana con Prot. n. 0177764 del 21/04/2021

# EUROCITIES: ENVIRONMENTAL FORUM
## Issued on: April 2021
## By: Comune di Firenze

**MEETING**

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air quality circular economy citizens cohesion policy economic development energy efficiency funding & investment governance jobs participation procurement sustainability urban planning water

# EEF: people and planet for the green transition (28-30 April)

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| **forums** | |
| **date** | 17-03-2021 |
| **publication date** | 17-03-2021 |
| **document type** | |
| **start date** | 28-04-2021 |
| **end date** | 30-04-2021 |

We are delighted to announce the theme of our EEF hosted online by Porto and Guimaraes as "people and planet for a green transition". Join us for three mornings between **28, 29 and 30 April** as we discuss what it means to transition to a healthy and thriving city for all, explore case studies and analyse how we can achieve the status of a thriving city moving forward.

Registrations will open very soon. Watch this space! A hint of what's to come? Oh alright…

**Driving the green transition through recovery**

*Wednesday 28 April @ 09.30-13.30 CET*

What does it mean to have a 'green transition'? How can we use recovery strategies to drive the green transition?

*Join us as we explore what is means to transition, hold a high-level political debate on driving the transition through recovery and network with our cities to learn how we can localise the European Green Deal through a city showcase (open call – got something to showcase? Get in touch!).*

**How to enact the green transition locally**

*Thursday 29 April @ 09.30-12.20 CET*

http://members.eurocities.eu/eurocities/calendar/events_list/EEF-people-and-planet-for-the-green-transition-28-30-April-WEBP-BZ7C6B

# Paper submitted to AIA Congress
# "IL PROGETTO LIFE E-VIA"

**Issued on: May 2021**

**By: Comune di Firenze, Vie en.ro.se. Ingegneria, UNIRC**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_7

Associazione Italiana di Acustica
47° Convegno Nazionale
24-28 maggio 2021

## IL PROGETTO LIFE E-VIA: CONTROLLO DEL RUMORE DEI VEICOLI ELETTRICI MEDIANTE VALUTAZIONE E OTTIMIZZAZIONE DELL'INTERAZIONE PNEUMATICO/ASFALTO

Raffaella Bellomini (1), Chiara Bartalucci (1), Arnaldo Melloni (2), Filippo G. Praticò (3)

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2) Comune di Firenze, Firenze, arnaldo.melloni@comune.fi.it
3) Università Mediterranea di Reggio Calabria, Regio Calabria, filippo.pratico@unirc.it

**SOMMARIO**

Il progetto Life E-VIA "Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction", co-finanziato nell'ambito dell'obiettivo prioritario del Programma Life2018 collegato all'inquinamento acustico, affronta la problematica del rumore da traffico stradale, ponendosi in una prospettiva futura in cui i veicoli elettrici e ibridi saranno una parte consistente del traffico stradale e combinando asfalti a bassa rumorosità con pneumatici specifici per i veicoli elettrici.

# Presentation of the project to the European Tire and Rim Technical Organisation (ETRTO)

**Issued on: May 2021**

**By: Continental**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**

Code: 36_8

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201
With the contribution of the LIFE programme of the European Union

Carsten Hoever – Continental Reifen Deutschland GmbH

*carsten.hoever@conti.de*

## Objectives

LIFE18 ENV/IT/000201

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**.





## Objectives

LIFE18 ENV/IT/000201

3. To contribute to **EU legislation effective implementation** providing rolling noise coefficients within the Common Noise Assessment Method (**CNOSSOS-EU**), specifically tuned for EVs, aiming at helping to developing **future scenarios.**



## Pilot Area Florence

LIFE18 ENV/IT/000201

- As a pilot implementation a section of a road in Florence will be paved with the new low-noise road surface.
- The pilot area will be the focus of further actions relating to
  - performance and wear/ageing monitoring of the new surface,
  - LCA/LCAA analysis,
  - Soundscape analysis,
  - …
- The re-pavement of the road will also be linked to an EV festival planned to be held in Florence which shall promote Electric Mobility.

# Lesson carried out by CRD to students the University of Applied Sciences in Hanover

**Issued on: June 2021**

**AWARENESS ACTIVITIES**

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201
With the contribution of the LIFE programme of the European Union

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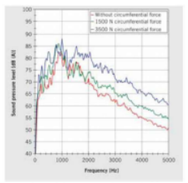
## Warum besondere Anforderungen an Reifen und Straße für Elektrofahrzeuge?

LIFE18 ENV/IT/000201

Im Vergleich zu Fahrzeugen mit Verbrennungsmotoren...

Akustische Aspekte
Weitere relevante Aspekte

- ...sind EVs schwerer.
  - Höhere Reifenlast → höheres Rollgeräusch.
  - Stärkere Abnutzung von Reifen und Straße.
- ...haben EVs in einem weiten Drehzahlbereich ein höheres Drehmoment.
  - Zusätzliche Rollgeräusch-Anregemechanismen.
  - Stärkere Abnutzung von Reifen und Straße.
- ...gibt es einen nochmals verstärkten Fokus auf niedrigem Rollwiderstand.
  - Niedrigerer Rollwiderstand →höhere Fahrzeugreichweite →höhere Kundenakzeptanz.



Quelle: F. Stalter et al.: Influence of driving torque on tyre noise, Auto Tech Review 10/2013, 34-38.

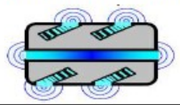


## Absorbierende Straßenbeläge

LIFE18 ENV/IT/000201

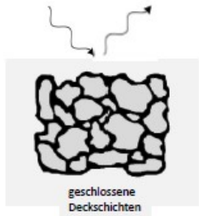
Absorption entlang der Luftschallausbreitung

Minderung von akustischen Resonanzen in der Aufstands-fläche

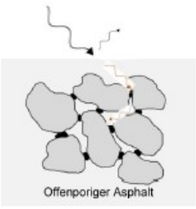


Reduzierung des Horneffektes

Horneffekt: effiziente Abstrahlung aufgrund kontinuierlicher Impedanzanpassung in der Horngeometrie




Auftreffender Schall wird nahezu komplett reflektiert



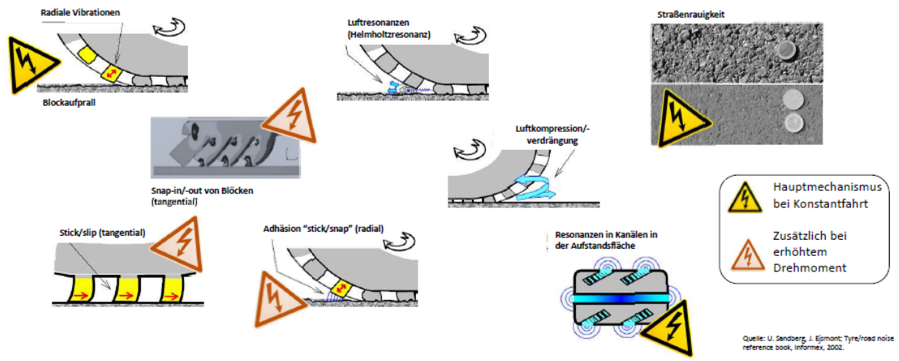

Ein Teil des Schalls dringt in die Deckschicht ein und durch viskose Reibung dissipiert

Nachteile:
- Verstopfung der Poren
- Kürzere mechanische Lebensdauer



## Anregungsmechanismen des Reifen-/ Fahrbahngeräusches

LIFE18 ENV/IT/000201




Quelle: U. Sandberg, J. Ejsmont: Tyre/road noise reference book, Informex, 2002.

**Article published in an open access journal**

**NOISE MAPPING**

**Issued on: June 2021**

**By: Université Gustave Eiffel**

Deadline: 31/12/2022

**ARTICLE IN A TOP RANKED JOURNAL**

Code: 15



# Road surface influence on electric vehicle noise emission at urban speed

*Julien Cesbron, Simon Bianchetti, Marie-Agnès Pallas, Adrien Le Bellec, Vincent Gary and Philippe Klein*

https://doi.org/10.1515/noise-2021-0017

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Cite this

DE GRUYTER Noise Mapp. 2021; 8:217–227

Research Article

Julien Cesbron*, Simon Bianchetti, Marie-Agnès Pallas, Adrien Le Bellec, Vincent Gary, and Philippe Klein

Road surface influence on electric vehicle noise emission at urban speed

https://doi.org/10.1515/noise-2021-0017
Received Jan 29, 2021; accepted Apr 23, 2021

**Abstract:** Considering the relative quietness of electric motors, tyre/road interaction has become the prominent source of noise emission from Electric Vehicles (EVs). This study deals with the potential influence of the road surface on EV noise emission, especially in urban area. A pass-by noise measurement campaign has been carried out on a reference test track, involving six different road surfaces and five electric passenger car models in different vehicle segments. The immunity of sound recordings to background noise was considered with care. The overall and spectral pass-by noise levels have been analysed as a function of the vehicle speed for each couple of road surface and EV model. It was found that the type of EV has few influence on the noise classification of the road surfaces at 50 km/h. However, the noise level difference between the quietest and the loudest road surface depends on the EV model, with an average close to 6 dBA, showing the potential effect of the road surface on noise reduction in the context of growing EV fleet in urban area. The perspective based on an average

the European area, where about 2.5 million of electric passenger cars were in circulation at the end of 2020. This figure comprises battery electric vehicles (BEVs) and plug-in electric vehicles (PHEVs). The market share of new EV registrations over the European area has been reaching 9.4% in 2020 against 3.7% in 2019. Depending on projection scenarios [2], it is expected to reach 15% to 30% of the global vehicle fleet by 2030.

A main advantage of EVs is that there is no exhaust emission while driving in pure electric mode, locally improving air-quality. EVs also contribute to the reduction of CO2 emission in the struggle against global warming [3]. Another key asset of EVs is the relative quietness of electric motors. This leads to the predominance of tyre/road noise from about 20 km/h at steady speed [4, 5]. According to EEA [6], in 2019 at least 20% of the European population was still exposed to noise levels that are considered harmful to human health. This burden is mainly due to road traffic noise, with more than 100 million EU citizens affected by high noise levels exceeding WHO recommendation [7]. Therefore, the development of low emission zones

# Journées Techniques Acoustique et Vibrations JTAV 2021

## "Projet LIFE E-VIA : Influence du revêtement de chaussée sur l'émission sonore des véhicules électriques"

**Issued on: June 2021**

**By: : Université Gustave Eiffel**

Deadline: 31/01/2023

**SCIENTIFIC PRESENTATION IN NATIONAL CONGRESS**

Code: 36_9

JOURNEES TECHNIQUES ACOUSTIQUE ET VIBRATIONS

JTAV 2021 - SÉMINAIRE DE TRANSFERT COP ▾ ARCHIVES ▾

Accueil (/jtav-2021-seminaire-de-transfert-cop/) / JTAV 2021 - Séminaire de transfert COP (/jtav-2021-seminaire-de-transfert-cop/) / Programme

JTAV 2021 - SÉMINAIRE DE TRANSFERT COP

(/JTAV-2021-SEMINAIRE-DE-TRANSFERT-COP/)

PROGRAMME (/JTAV-2021-SEMINAIRE-DE-TRANSFERT-COP/PROGRAMME/)

ARCHIVES ▾

(/ARCHIVES/JTAV-2020/)

### Programme

Lundi 7 juin (séminaire de transfert COP)

- 9h30 - 9h40 Présentation du COP - Axe 3 *J. Lelong (Univ. G. Eiffel/UMRAE)*
- 9h40 - 10h05 Présentation de l'UMRAE *J. Picaut (Univ. G. Eiffel/UMRAE)*
- 10h05 - 10h45 Elaboration de modèles d'émission sonore représentatifs de nouvelles catégories de sources routières *M.-A. Pallas (Univ. G. Eiffel/UMRAE)*
- 10h45 - 11h25 Amélioration des méthodes de caractérisation des émissions de bruit ferroviaire *O. Chiello & M.-A. Pallas (Univ. G. Eiffel/UMRAE)*
- *Pause*
- 13h30 - 14h30 Présentation de NoiseModelling - Utilisation dans le cadre de la recherche
  - Présentation de NoiseModelling et application *P. Aumond (Univ. G. Eiffel/UMRAE)*
  - Couplage Symuvia/MatSim *A. Can @ V. Lebescond (Univ. G. Eiffel/UMRAE)*
  - Nouveaux développements pour la prise en compte des façades végétalisées *B. Gauvreau (Univ. G. Eiffel/UMRAE)*
- 14h30 - 14h50 Présentation de l'outil PLAMADE et couplage avec NoiseModelling *S. Cariou (Cerema/DTecITM) & D. Ecotière (Cerema/DterEst/UMRAE)*
- 14h50 - 15h30 Impact du bruit des avions sur la santé : le projet DEBATS *A.-S. Evrard (Univ. G. Eiffel/UMRESTTE)*
- 15h30 Table ronde *A. Kavaj & M.-C. Bihoreau (DGITM), Ph. Maraval & F. Leray (DGPR), XX (DGAC)*

Mardi 8 juin (JTAV)

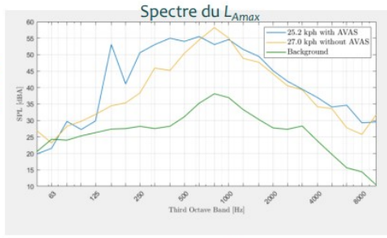
- 9h30 - 9h55 Projet LIFE E-VIA : Influence du revêtement de chaussée sur l'émission sonore des véhicules électriques *J. Cesbron - S. Bianchetti, M.-A. Pallas, A. Le Bellec, V. Gary, Ph. Klein (Univ. G. Eiffel/UMRAE)*
- 9h55 - 10h20 Projet LIFE Cool & Low Noise Asphalt : suivi des performances acoustiques des revêtements de chaussée à faible bruit dans le centre ville de Paris *C. Ribeiro (BruitParif)*
- 10h20 - 10h45 Méthode d'estimation des incertitudes du bruit éolien en conditions favorables à la propagation *B. Kayser (Univ. G. Eiffel/UMRAE)*
- 10h45 - 11h10 Estimation du coefficient d'absorption acoustique moyen par des méthodes de machine learning *C. Foy (Cerema/DterEst/UMRAE) A. Deleforge & D. Di Carlo (INRIA)*
- 11h10 - 11h35 Evaluation environnementale d'une conduite autonome : méthodologie acoustique et vibratoire *Ph. Dunez (Cerema/DterNP/TEER/ABV)*
- *Pause*
- 13h30 -13h55 Création d'une base de données des Points Noirs du Bruit dans les Quartiers Prioritaires du NPNRU *L. Mazouz Cerema/DterNP/TEER/ABV)*
- 13h55 - 14h20 Réseau à grand nombre de microphones et problèmes inverses mis en jeu *Ch. Vanwinsberghe (ISEN Yncréa Ouest)*
- 14h20 - 14h55 Plate-forme expérimentale de mesures acoustiques en temps réel *S. Carra, V. Janillon (Acoucité)*
- 14h55 - 15h20 Prédiagnostic sonore en milieu industriel : développement d'un "kit smartphone" *Isabelle Smith Yamane & A. Alarcon (EDF)*
- 15h20 Questions diverses - clôture des JTAV 2021

## Des recherches en cours à l'UMRAE

- **Projet européen LIFE E-VIA (2019-2023) :**
  - **E**lectric **V**ehicle **N**oise Control by **A**ssessment and Optimisation of Tyre/Road Interaction
  - Julien Cesbron et al., Projet LIFE E-VIA : *influence du revêtement de chaussée sur l'émission sonore des véhicules électriques*, JTAV 2021, 8/06/2021
  - https://life-evia.eu/
- **Signal d'alerte AVAS :** caractérisation sous une approche environnementale
  - Comparaison aux niveaux d'émission CNOSSOS-EU / CNOSSOS-FR

Spectre avec AVAS

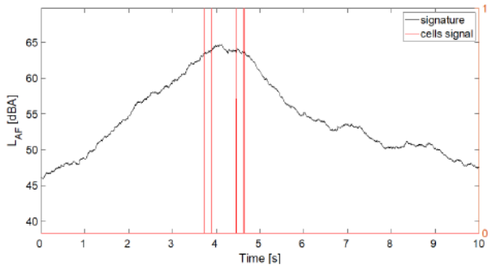
Spectre sans AVAS

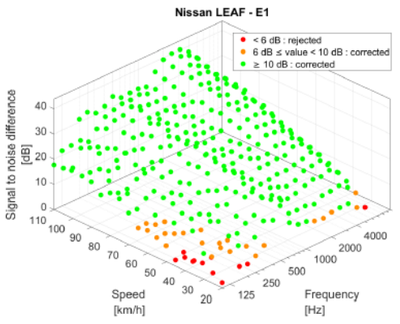



Séminaire COP - Univ. Eiffel 25 7/06/2021

## Noise analysis

- $L_{Amax}$ identification from the time signature for each run
- Spectra in 1/3 octave frequency band between 100Hz and 5000Hz
- Correction of background noise level (SNR<6dBA rejected)




JTAV 2021 – Visio-conférence 11 08/06/2021

# Video of the prototype construction in Nantes

## "Low-noise road surface prototype for electric vehicles"

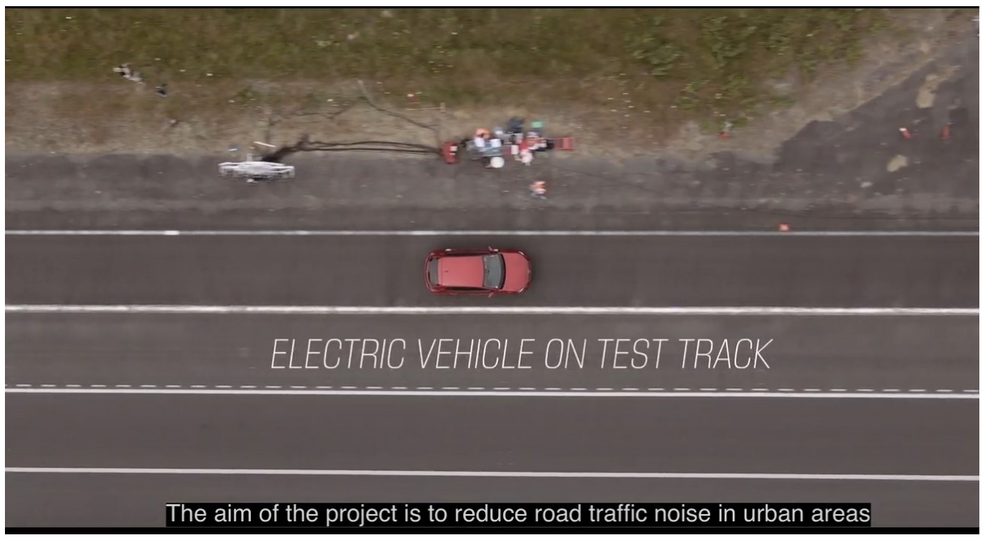
**Issued on: June 2021**

**By: Universitè Gustave Eiffel**

Deadline: 31/12/2022

**VIDEO OF THE PROTOTYPE CONSTRUCTION**
Code: 8







**Video available on the official YouTube channel of UMRAE-UniEiffel and on the UMRAE website**

Low noise road surface prototype for electric vehicles (EU LIFE E-Via project, LIFE18 ENV/IT/000201) - YouTube

# LIFE E-VIA: objectives and actions (FR)

**Issued on: July 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN FRENCH LANGUAGE**

Code: 21_1

## LIFE E-VIA

Contrôle du bruit des Véhicules Électriques par l'évaluation et l'optimisation de l'interaction pneumatique/chaussée

**Contexte**

Les données d'exposition de l'Agence Européenne pour l'Environnement (AEE) montrent que plus de 100 millions de citoyens de l'UE sont affectés par des niveaux de bruit élevés ayant un impact négatif sur la santé de la population. À lui seul, le bruit de la circulation routière est néfaste pour la santé de près d'une personne sur trois en Europe, d'après l'Organisation Mondiale de la Santé (OMS). 20 % des Européens sont régulièrement exposés à des niveaux sonores nocturnes susceptibles de nuire considérablement à la santé, en particulier dans les zones urbaines. Comme cela a été mis en évidence lors de la conférence *Noise in Europe* (avril 2017) et dans les recommandations de l'OMS publiées en octobre 2018, le durcissement des normes européennes à la source doit être complété par d'autres mesures efficaces telles que l'amélioration des revêtements routiers et des pneumatiques, ainsi que l'aménagement urbain.

L'une des solutions environnementales les plus efficaces pour réduire le bruit en milieu urbain, tant en matière de bruit que de qualité de l'air, est l'introduction de la **mobilité électrique**. Ainsi, pour répondre aux nouvelles exigences des véhicules électriques (VE), il est nécessaire d'approfondir les connaissances sur l'interaction pneumatique/chaussée. De plus, pour la mise en œuvre de la directive européenne 2002/49/CE, les coefficients permettant d'appliquer le modèle CNOSSOS (directive 996/2015/CE) aux nouveaux spectres de trafic et aux nouveaux véhicules restent totalement inexistants.

**Objectifs**

1. **Réduire le bruit** routier au sein des zones urbaines très peuplées par la mise en œuvre d'une solution visant à **optimiser les revêtements routiers et les pneumatiques des véhicules électriques (VE)**. Deux revêtements routiers, au moins 5 modèles de VE, un véhicule à moteur thermique (VMT) de référence et 3 types de pneumatiques (y compris des pneus spécialement conçus pour les VE) seront testés pour chaque technologie de véhicule.
2. Estimer **l'efficacité et le gain potentiel de réduction des pneus, des revêtements et de trafic** (spectre du trafic, vitesses, conditions de conduite) à une échelle plus complète : une Analyse du Cycle de Vie (**ACV**) et une Analyse du Coût du Cycle de Vie (**ACCV**) seront réalisées pour démontrer l'efficacité respective et synergique des revêtements de chaussées, des pneus et des véhicules (y compris la comparaison entre trafics constitués de véhicules thermiques uniquement, de véhicules électriques ou mixtes).
3. Contribuer à la **mise en œuvre effective de la législation européenne** (directives 2002/49/CE et 2015/996/CE), en fournissant des coefficients de bruit de roulement pour la méthode commune d'évaluation du bruit (**CNOSSOS-EU**), spécifiquement adaptés aux VE, données encore non disponibles pour les professionnels, les organismes et les ministères en charge d'élaborer des scénarios futurs.
4. Contribuer aux **politiques nationales et régionales italiennes**, en publiant des **recommandations** sur l'utilisation et l'application de la méthodologie issue du projet, qui seront adoptées par la Région Toscane, via l'Agenzia Regionale pour l'Environnement de Toscane (ARPAT) soutenant le projet. La Région de Calabre et la ville Reggio de Calabre ont également exprimé leur intérêt.
5. **Sensibiliser** le public à la pollution sonore et aux effets sur la santé en expliquant les possibilités offertes par les véhicules électriques par le biais d'événements de communication et de promotion spécifiques, tout en étudiant la perception des personnes vis-à-vis du bruit sous l'angle méthodologique du paysage sonore et en les impliquant dans l'acquisition de données sur le bruit.
6. Démontrer et promouvoir la **mobilité routière durable (électrique)**, en réduisant les émissions sonores de 3 dB(A) en bord de route et simultanément celles de CO2 (21%), sur la base du scénario Italien (véhicules ZEV, BNC, hybrides, électriques, à essence, diesel) et de la littérature spécialisée.
7. **Encourager la mise en œuvre de revêtements à faible niveau de bruit dans d'autres scénarios européens et extra-européens**, en démontrant leur durabilité et leur pérennité, grâce à une analyse du cycle de vie (ACV) et une évaluation du coût du cycle de vie (CCV) spécifiques.

**Actions**

**A. Actions préparatoires**
A1 Les véhicules électriques et leurs émissions sonores
A2 Les technologies de chaussées peu bruyantes et la pérennité de leurs performances
A3 Le rôle du pneumatique dans le nouveau contexte des VE et des VMT

**B. Actions de mise en œuvre**
B1 Conception de la formulation du revêtement de chaussée
B2 Étude du couplage pneumatique-chaussée et réalisation du prototype
B3 Zone pilote : Mise en œuvre, Reproductive et transférabilité
B4 Tests d'efficacité des voies dans la zone pilote
B5 Analyse du paysage sonore
B6 Évaluation des émissions sonores des VE
B7 Performance holistique des pneumatiques

**C. Suivi de l'impact des actions du projet**
C1 Suivi de l'impact des actions du projet
C2 Analyse du cycle de vie (ACV) et coût du cycle de vie (CCV)

**D. Sensibilisation du public et diffusion des résultats**
D1 Activités d'information et de sensibilisation
D2 Activités de diffusion technique auprès des parties prenantes

**E. Gestion du projet**

***PARTIES PRENANTES***


Site web du projet: https://life-evia.eu/



LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

# Articles published on Italian journals

## Issued on: July 2021

**NETWORKING ACTIVITIES**

MP

Bimestrale

Data 07-2021
Pagina 74
Foglio 1

PROGETTI EUROPEI LIFE NEREIDE E LIFE E-VIA

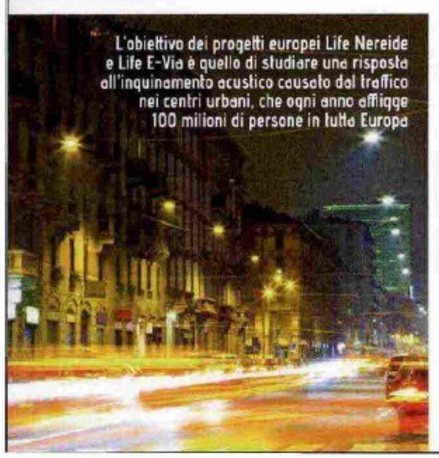
# Asfalti con materiali riciclati contro l'inquinamento acustico e a favore della mobilità elettrica

In Italia sono in corso due progetti europei, Life Nereide e Life E-Via, che intendono proporre soluzioni contro l'inquinamento acustico: uno dei problemi ambientali che toccano maggiormente la salute e la qualità della vita della popolazione europea. L'Agenzia Europea dell'Ambiente (EEA) stima infatti che siano oltre 100 milioni i cittadini europei esposti in maniera prolungata a livelli di rumore eccessivi e che, per questo, rischino conseguenze anche gravi per la salute. Stima inoltre che l'inquinamento acustico stradale notturno, ancora più dannoso per la salute, colpisca almeno il 20% della popolazione europea che vive nelle aree urbane.

Alcune tra le azioni più efficaci introdotte per risolvere questo problema riguardano la realizzazione di pavimentazioni stradali a bassa emissione sonora, ottenute anche con materiali di riciclo, e la progressiva diffusione della mobilità elettrica. Nati per analizzare i benefici possibili derivanti da tali soluzioni, Life Nereide e Life E-Via sono due progetti finanziati dal programma Life, volto a sostenere azioni a favore dell'ambiente e del clima.

Il progetto Life Nereide, che si sta avviando alla conclusione, ha portato alla definizione delle migliori soluzioni per realizzare pavimentazioni estremamente silenziose e sostenibili, capaci di ridurre il rumore del traffico fino a 5 dB grazie a un uso intelligente di materiali quali il polverino di gomma riciclata e il fresato d'asfalto, ottenuto dalla rimozione di vecchie pavimentazioni. Il progetto è guidato dal Dipartimento d'Ingegneria Civile e Industriale dell'Università di Pisa e vede come partner la Regione Toscana e l'agenzia regionale Arpat, il centro di ricerca belga BRRC, l'Idasc-CNR e il consorzio Ecopneus. Grazie al progetto sono state definite 12 differenti mescole bituminose, posate su diverse strade della Toscana; sono state poi effettuate misurazioni acustiche sulle pavimentazioni e indagini sulla popolazione, per conoscere gli effetti concreti su chi vive nei pressi di strade a elevato scorrimento.

Dal canto suo, il progetto Life E-Via si sta invece concentrando sui veicoli elettrici e ibridi, studiandone l'interazione pneumatico-strada per individuare e implementare misure di mitigazione del rumore attraverso l'ottimizzazione sia degli pneumatici sia del fondo stradale, anche attraverso lo sviluppo di un nuovo asfalto "silenzioso" messo a punto grazie a un approccio simile a quello adottato da Life Nereide. Il progetto vede coinvolti il Comune di Firenze, in qualità di coordinatore, e i partner: Continental, iPool, Università Gustave Eiffel, Università degli Studi di Mediterranea di Reggio Calabria e Vie En.Ro.Se. Ingegneria.



L'obiettivo dei progetti europei Life Nereide e Life E-Via è quello di studiare una risposta all'inquinamento acustico causato dal traffico nei centri urbani, che ogni anno affligge 100 milioni di persone in tutta Europa



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15-LUG-2021
da pag. 1-9 /
foglio 2 / 2

IN VIA PAISIELLO

## Arriva l'asfalto anti rumore

**Sono** iniziati ieri i lavori di asfaltatura in via Paisiello. Non si tratta di semplice bitume, ma di un nuovo asfalto anti rumore che viene sperimentato proprio a Firenze. Un materiale, che permette una riduzione delle emissioni rumorose prodotte dalle auto e rientra nel progetto Life E-Via, che vede Firenze città capofila. I lavori proseguiranno fino a venerdì con restringimenti di carreggiata su via Paisiello tra via Rinuccini e via Lagorio e chiusure delle traverse laterali. «**Grazie** a questo progetto – hanno detto l'assessore all'Ambiente Cecilia Del Re e l'assessore alla Mobilità Stefano Giorgetti – possiamo contribuire a ridurre l'inquinamento acustico nelle aree urbane». L'obiettivo è quello di ottimizzare asfalti e pneumatici per ridurre il rumore. Il Progetto, co-finanziato dall'Unione europea ha avuto inizio a luglio 2019 e terminerà a gennaio 2023.



Un passo avanti per la costruzione del sistema tramviario dell'area metropolitana

# Report INAD Italia 2020-2021 (ITA)

**Issued on: July 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**REPORT ON YEARLY PARTICIPATION IN INAD**

Code: 25_1

Associazione Italiana di Acustica

**INTERNATIONAL**

**NOISE AWARENESS DAY**

**INAD Italia 2020-21**

***"AscoltiAMO i suoni"***


***Report finale***

É stata inoltre svolta una intensa comunicazione sui social network e attraverso contatti diretti con molte redazioni giornalistiche, con scuole musicali e conservatori italiani.

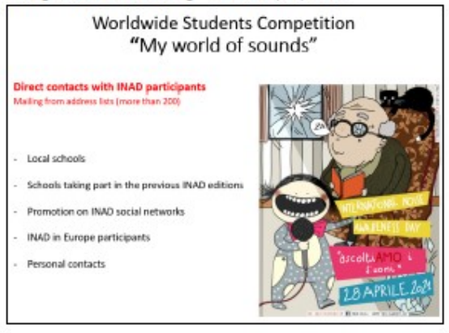
LIFE E-VIA project (LIFE18 ENV/IT/000201): il progetto, finanziato dall'Unione Europea, si concentra sulle potenzialità di utilizzo dei veicoli elettrici ed ibridi, che in futuro avranno un ruolo importante nel mercato automobilistico. Il progetto studia l'interazione pneumatico-strada per individuare ed implementare misure di mitigazione del rumore, attraverso l'ottimizzazione sia degli pneumatici dei veicoli elettrici sia del fondo stradale. Inoltre il progetto prevede un'intensa attività di disseminazione e sensibilizzazione sul tema del rumore, organizzando anche attività negli istituti scolastici, in accordo e in collaborazione anche con l'attività portate avanti nelle diverse Nazioni dei partner del Progetto (Italia, Francia e Germania) nell'ambito di INAD.

L'evento è stato diffuso principalmente attraverso i seguenti canali:

CONVEGNI:

- Convegno Nazionale AIA – Online 24-28/05/2021

- IYS 2020-2021 Steering Committee Meeting – Online 16/01/ 2021




WEB:

- siti internet di: Associazione Italiana di Acustica, EAA, Documenta Acustica, IYS 2020-21
- siti internet delle scuole e degli Enti partecipanti.

SOCIAL NETWORK:

- pagina facebook: INAD Italia;
- gruppo facebook: Noise Awareness Day Italia;
- pagina facebook: Intenational Year of Sound.

# Abstract submitted to BCRRA conference
# "Asphalt concretes for electric vehicles"

**Issued on: June 2021**

**By: UNIRC**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_10

**Abstract submitted to 11th International Conference on the Bearing Capacity of Roads, Railways and Airfields (BCRRA)**.

Authors: *Praticò F.G., Briante P.G., Colicchio G., Fedele R.*

Abstract: The interaction among electric vehicles (EVs) and road pavements affects road performance in a different way with respect to internal combustion engine vehicles (ICEVs). Consequently, the design of asphalt concrete road pavements for EVs should take into account both functional and mechanistic characteristics. In particular, porosity, resistivity, tortuosity and thickness should be considered to estimate the acoustic absorption, while surface texture should be measured to characterize road pavements consisting in both traditional and recycled materials. Unfortunately, there is still lack of methods to consider both functional and mechanistic characteristics for EVs. Based on the above, the main objective of the study here presented is to set up and apply a method to predict the acoustic and mechanistic performance of road pavements to face EV-related problems. GAP graded and Dense graded (i.e., GAP – AC6o, and DGFC – AC6d) mixtures, with different crumb rubber percentages, were produced using the gyratory compactor. Consequently, experimental investigations were carried out to derive acoustic and mechanic properties (including acoustic absorption, airflow resistivity, skid resistance, permeability, and surface texture.
Finally, the prediction model was set up and validated using the experimental results. Results show that the proposed model is helpful in selecting and ranking bituminous mixtures based on requirements.

Keywords: Electric vehicle, Road Pavement, Acoustic Absorption, Airflow resistivity, Recycled materials.

*Paper submitted to BCRRA2021 will be presented the next year at BCRRA 2022.*

# Paper submitted to ICSV27 “THE INTERNATIONAL YEAR OF SOUND: WORLD WILD PROJECTS AND INITIATIVES”

**Issued on: July 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_11

27th International Congress on Sound and Vibration
The annual congress of the International Institute of Acoustics and Vibration (IIAV)
11-16 July, 2021
ICSV27
Annual Congress of the International Institute of Acoustics and Vibration (IIAV)

## THE INTERNATIONAL YEAR OF SOUND: WORLDWIDE PROJECTS AND INITIATIVES

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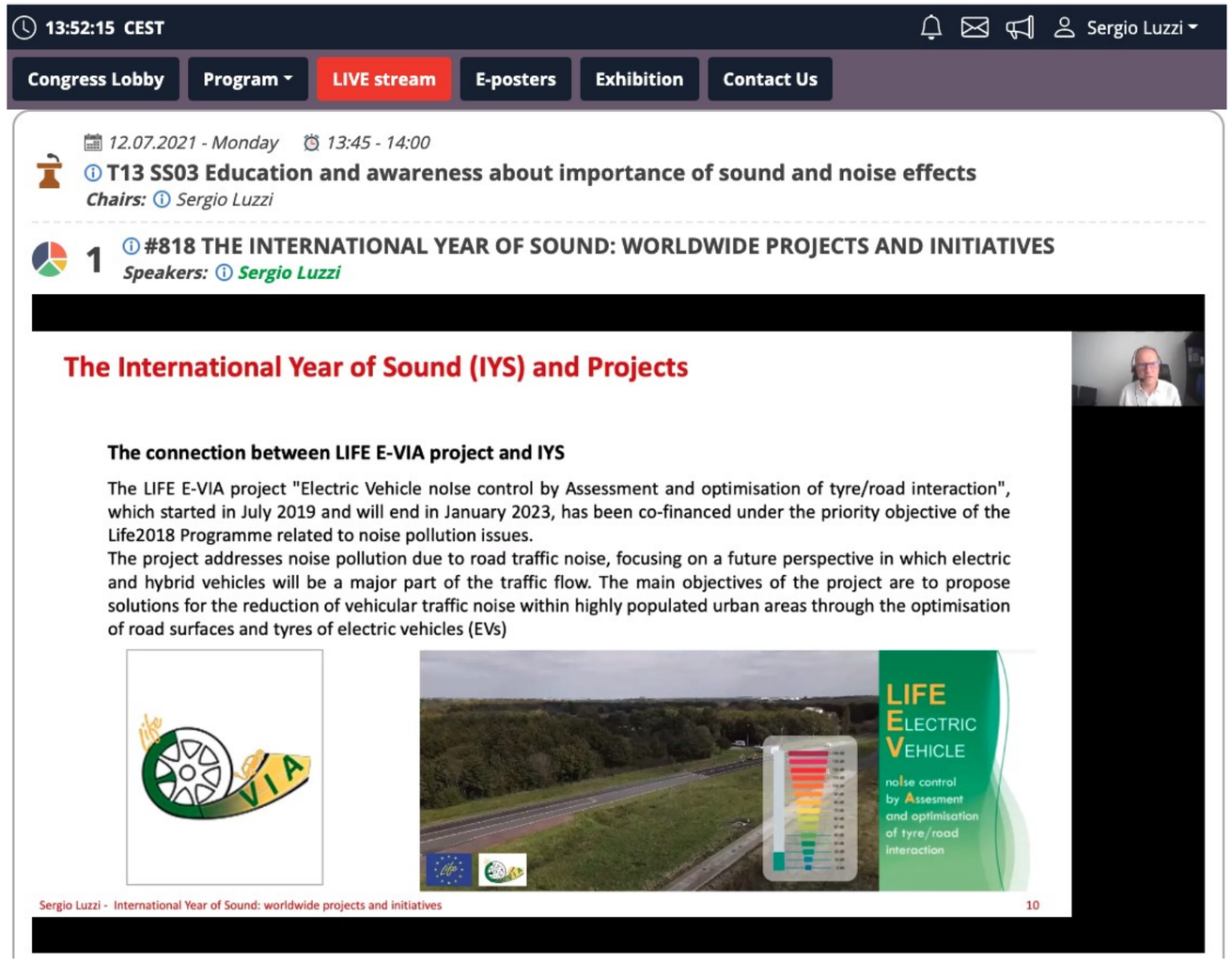
Sound plays an important role in the enjoyment of landscapes as well as in all human activities included education and it is also an essential part of communication between humans, in the form of speech and listening, creative sounds and music. The International Year of Sound (IYS) is a global initiative under the UNESCO Charter of Sound No. 39C/59. Its purpose is to highlight the importance of sound and the related sciences and technologies in the society and the world, considering landscape aspects and noise control in nature, in the built environment and in workplaces. IYS 2020-21 includes activities organized at the regional, national and international level by the International Commission for Acoustics (ICA). Among them there is a competition for students from around the world on the theme of "My World of Sounds". In particular, primary and middle school students are asked to produce drawings, images, patchwork, collages and similar related to their world of sounds, while high school students are asked to write a verse of the song entitled "We are the sounds of our world", inspired by the melody and refrain of the latter. Moreover, several events such as conferences, seminars, workshops but also performances, exhibitions had been included in the program of national IYS initiatives, as long as they are consistent with the message of the initiative. Due to the spread of the Covid-19 pandemic, only few initiatives took place, nevertheless some international projects have been carried on. In this paper a general updated overview on activities organised in the frame of the IYS is given and the state of implementation of some projects connected with IYS are shown.

Keywords: International Year of Sound, UNESCO, worldwide activities, LIFE projects



# Paper submitted to ICSV27
# "THE LIFE E-VIA PROJECT"

**Issued on: July 2021**

**By: Comune di Firenze, Vie en.ro.se. Ingegneria**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_12

27th International Congress on Sound and Vibration
The annual congress of the International Institute of Acoustics and Vibration (IIAV)
11-16 July, 2021
ICSV27

Annual Congress of the International Institute of Acoustics and Vibration (IIAV)

## THE LIFE E-VIA PROJECT: NOISE CONTROL OF ELECTRIC VEHICLES THROUGH ASSESSMENT AND OPTIMISATION OF TYRE/ASPHALT INTERACTION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European Environment Agency (EEA) data shows that some 100 million EU citizens are affected by high noise levels, negatively impacting their health. Traffic noise alone is harmful to the health of 40 million EU citizens of which 8 million are regularly exposed to high traffic noise level at night. European policies to reduce environmental noise, and in particular road traffic noise, in densely populated cities are focused on the introduction of low-noise asphalts and a progressive increase in the use of electric vehicles. The LIFE E-VIA "Electric Vehicle noIse control by Assessment and optimization of tyre/road interaction" project, co-funded under the priority objective of the Life2018 Programme related to noise pollution, addresses the issue of road traffic noise. Specifically, it looks ahead to a future where electric and hybrid vehicles will be a major part of road traffic and combining low-noise asphalts with tyres specifically for electric vehicles. The LIFE E-VIA project, started in July 2019 with a foreseen duration of 42 months, will foster the application of Directive 2002/49/EC on the assessment and management of environmental noise and of Directive 996/2015/EC on establishing common noise assessment methods (CNOSSOS model), in the context of the promotion and use of electric vehicles (EVs) and hybrid vehicles. The project will seek to develop a solution to reduce the rolling noise of electric and hybrid vehicle tyres in urban areas, taking account of the current best practices, also addressing the soundscape analysis and citizens involvement.
In the present article, after an introduction on the future policies for the reduction of road traffic noise in Europe, the objectives of the LIFE E-VIA project and its methodology are described, demonstrating how the expected results are in line with European strategies. Finally, recent preliminary results achieved by some key actions of the project are mentioned.


Keywords: Rolling noise, electric vehicles, EU policies.


# Presentation/ paper at the
# DAGA 2021 - 47. Jahrestagung für Akustik

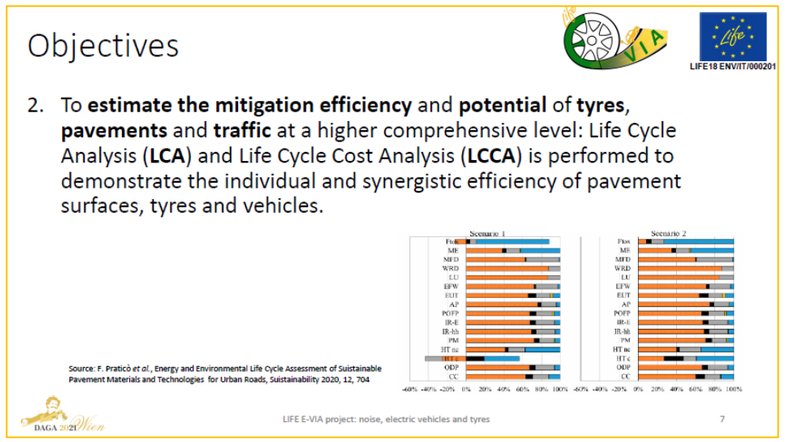
**Issued on: August 2021**

**By: CONTINENTAL**

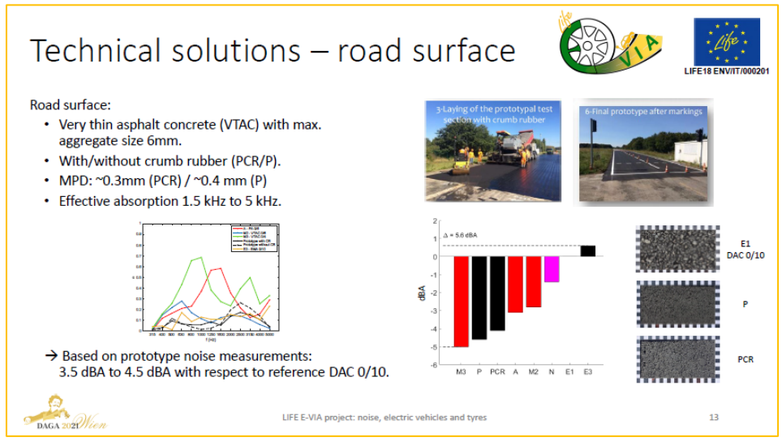
Deadline: 31/01/2023

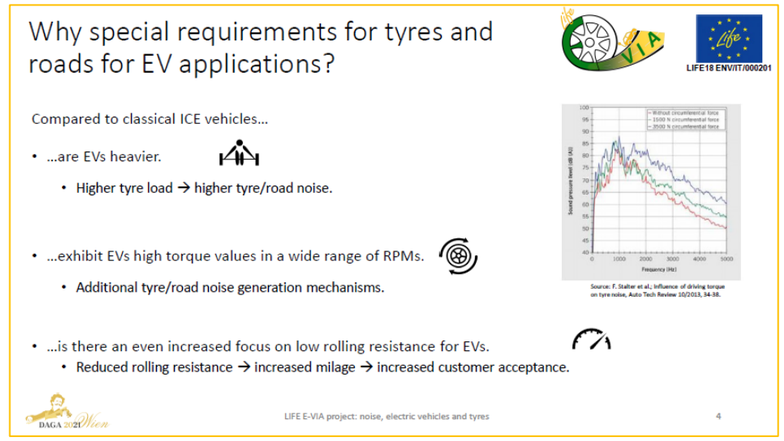
**SCIENTIFIC PAPERS**

Code: 36_13





# LIFE E-VIA: the pilot case (IT)

**Issued on: September 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_2

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

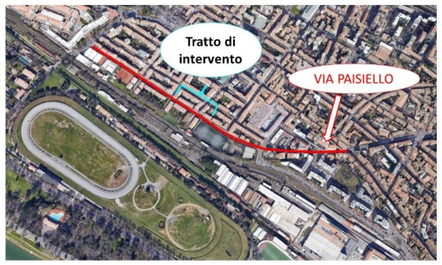
LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/road interaction

***Il caso pilota***

Dopo una fase progettuale seguita da una serie di accurati esperimenti di laboratorio, sono state selezionate due miscele di asfalto che sono state testate, durante il passaggio di veicoli elettrici, presso l'area di sperimentazione a Nantes. Al termine delle misure svolte in Francia, è stata scelta la miscela più efficace, contenente polverino di gomma da pneumatici riciclati. Quest'ultima è stata utilizzata presso il caso pilota individuato nella Città di Firenze, al fine di analizzare il beneficio apportato in termini di abbattimento del rumore da traffico veicolare. L'area pilota è stata identificata in Via Paisiello, caratterizzata da una significativa densità di abitazione. Il tratto di strada interessato dall'intervento è rettilineo e a senso unico di marcia. Inoltre, l'area pilota è caratterizzata da un elevato flusso di traffico dovuto alla vicinanza con il centro e alla presenza di uffici pubblici. Nelle vicinanze si trovano, inoltre, un importante parco pubblico (Cascine), interventi di riqualificazione urbana (Ex. Manifattura Tabacchi) e vari servizi pubblici, quali scuole, esercizi commerciali, impianti sportivi.

***Inquadramento Stato ante operam***




***Lavori di asfaltatura***

Rimozione asfalto

Stesura nuovo asfalto

Verifiche della tessitura

***Stato post operam***

Sito web: https://life-evia.eu/

# LIFE E-VIA: the pilot case (EN)

**Issued on: September 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_3

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

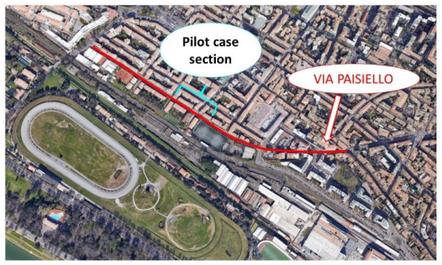
## LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/road interaction

***The Pilot case***

After an initial designing stage followed by careful laboratory experiments, two different asphalt mixtures have been selected and tested in the experimental area in Nantes, during the electric vehicles passages. The measurements carried out in France allowed to choose the most efficient mixture. This asphalt mixture contains crumb rubber from recycled tyres and it has been used in the pilot case in Firenze in order to analyse the benefits it provides to reduce traffic noise. Via Paisiello has been selected as a pilot area. It is characterized by a significant housing density. The section of the street where the asphalting works have been carried out, is straight and one-way. Moreover, the pilot area is characterized by a high level of traffic caused to its proximity to the city center and the presence of public offices. In the neighbourhood there are also an important public park (Cascine), urban regeneration interventions (Ex. Manifattura Tabacchi) and several public services, such as schools, commercial activities and sport installations.

***Ante operam status***




***Asphalting works***

Asphalt removal

Laying a new asphalt

Texture check

***Post operam status***

Sito web: https://life-evia.eu/

# LIFE E-VIA: the pilot case (FR)

**Issued on: September 2021**

**By: Université Gustave Eiffel**

Deadline: 31/12/2022

**NOTICEBOARD IN FRENCH LANGUAGE**

Code: 21_2

LIFE E-VIA

Contrôle du bruit des Véhicules Électriques par l'évaluation et l'optimisation de l'interaction pneumatique/chaussée

LIFE18 ENVIT/000201

Le projet pilote

Après une première phase de conception suivie d'expériences en laboratoire détaillées, deux enrobés ont été sélectionnés et testés sur la zone expérimentale de Nantes, au passage de véhicules électriques. Les mesures effectuées en France ont permis d'identifier le mélange le plus performant. Cette formule de béton bitumineux contient de la gomme provenant de pneus recyclés et a été utilisée dans le projet pilote à Florence afin d'analyser les avantages en matière de réduction du bruit de trafic. La rue Paisiello a été sélectionnée comme zone pilote. Elle se caractérise par une forte densité de logements. La section où les travaux de pose du béton bitumineux ont été réalisés est rectiligne et à sens unique. De plus, elle présente un niveau élevé de trafic dû à la proximité du centre ville et à la présence d'établissements publics. Dans le quartier, on trouve également un important parc public (Cascine), des opérations de réhabilitation urbaine (Ex. Manifattura Tabacchi) et divers établissements publics, tels que des écoles, des activités commerciales et des installations sportives.

État initial


Mise en œuvre du nouvel enrobé bitumineux

Élimination de l'ancien revêtement routier

Pose du nouveau béton bitumineux

Contrôle de la texture

État final

Site web: https://life-evia.eu/

*La responsabilité du contenu des communications/publications incombe exclusivement à leurs auteurs. Il ne reflète pas nécessairement l'opinion de l'Union européenne. Ni le CINEA ni la Commission Européenne ne sont responsables de l'usage qui pourrait être fait des informations qui y sont contenues.*

LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

# LIFE E-VIA: the pilot case (DE)

**Issued on: September 2021**

**By: CONTINENTAL**

Deadline: 31/12/2022

**NOTICEBOARD IN GERMAN LANGUAGE**

Code: 22_2

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

***Die Pilot-anwendung***

Als Ergebnis einer initialen Designphase gefolgt von umfassenden Laborexperimenten wurden zwei Asphaltmischungen ausgewählt und auf einer Teststrecke in Nantes mittels Geräuschmessungen für Vorbeifahrten von Elektrofahrzeugen getestet. Auf Basis dieser Ergebnisse konnte die bessere der beiden Mischungen identifiziert werden. Diese enthält als Besonderheit Gummigranulat von Altreifen. Im Rahmen einer Pilotanwendung wurde in Florenz ein Abschnitt einer Straße mit der ausgewählten Mischung asphaltiert, um das Potential zur Verringerung des Straßenverkehrslärms zu untersuchen. Bei der ausgewählten Via Paisiello handelt es sich um eine Einbahnstraße, die im Bereich der Neuasphaltierung gerade verläuft. Die Umgebung ist aufgrund ihrer Nähe zum Stadtzentrum durch eine hohe Wohndichte und ein hohes Verkehrsaufkommen gekennzeichnet. In der Nachbarschaft gibt es weiterhin einen bedeutenden öffentlichen Park (*Cascine*), Stadterneuerungsprojekte (z.B. *Manifatura Tabacchi*), Geschäfte und öffentliche Einrichtungen wie Schulen und Sportanlagen.

***Ausgangs-situation***


***Asphaltier-arbeiten***

Entfernung des Altbelages

Neuasphaltierung

Überprüfung der Oberflächenrauigkeit

***Ergebnis***

Webseite: https://life-evia.eu/

# LIFE E-VIA: Laboratory experiments(EN)

**Issued on: September 2021**

**By: UNIRC**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_4

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

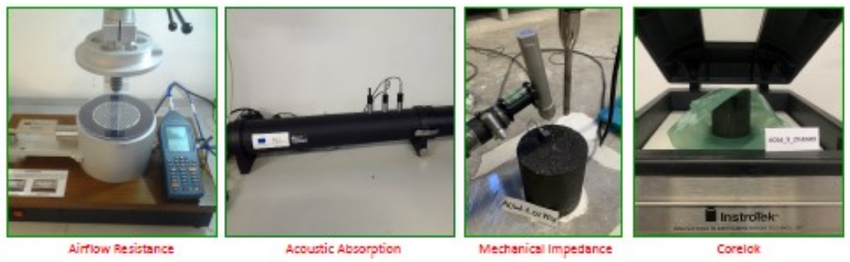
LIFE18 ENV/IT/000201

*Mix design*

The University 'MEDITERRANEA' of Reggio Calabria (UNIRC) analysed more than 150 solutions in the literature (friction courses), based on acoustic and non-acoustic performance, in order to select appropriate solutions. Their characteristics and impacts were considered and preliminary tests were carried out. From 150 asphalt concretes, nine mixtures were selected, based on many characteristics, including: 1) Acoustic response. 2) Expected life by referring to mechanistic properties. 3) Permeability. 4) Friction. 5) ENDT value.
Based on these latter, open asphalt concretes with Nominal Maximum Aggregate of 6 mm (AC6) were selected.
An accurate plan of experiments was set up and followed in order to design and validate the final mixtures. Two types of mixtures were finally designed and tested (AC6 with and without crumb rubber).

*Superpave compaction*

*Laboratory experiments*




Airflow Resistance | Acoustic Absorption | Mechanical Impedance | Corelok


Permeability | Skid Test | Sand Patch Test | Marshall Stability

Sito web: https://life-evia.eu/



LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

# EXPOMOVE21 'Conferenza internazionale mobilità sostenibile: uno sguardo europeo'

**Issued on: October 2021**

**By: Comune di Firenze, Vie en.ro.se. Ingegneria, UNIRC**

**EVENTS**
Code: E_4







# LIFE E-VIA: Leaflet (EN)

**Issued on: October 2021**

**By: Vie en.ro.se. Ingegneria**

**ADDITIONAL DOCUMENT**

***Objectives of the LIFE E-VIA project***

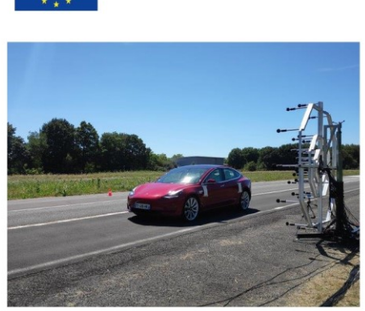
1. To reduce noise for roads inside very populated urban areas through the implementation of a mitigation measure aimed at optimizing road surfaces and tyres of EVs.
2. To estimate the mitigation efficiency and potential of tyres, pavements and traffic (traffic spectrum, speeds, handling conditions) at a higher and comprehensive level.
3. To 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).
4. To contribute to national and Italian regional policies, issuing guidelines about use and application of the methodology output of the project.
5. To raise people's awareness of noise pollution and health effects.
6. To demonstrate and promote sustainable road transport mobility (electric), reducing noise emission by 5 dB(A) at receivers' roadside and achieving also $CO_2$ emissions reduction.
7. To encourage low-noise surfaces implementation in further EU and extra-EU scenarios.

LIFE18 ENV/IT/000201

***www.life-evia.eu***

***life18.evia@gmail.com***

With the contribution of the LIFE programme of the European Union



*LIFE E-VIA*

**Electric Vehicle noIse control by Assessment and optimisation of tyre/ road interaction**

With the contribution of the LIFE programme of the European Union

**ExpoMove 21-22 edition**

**13th - 14th October 2021, Florence**

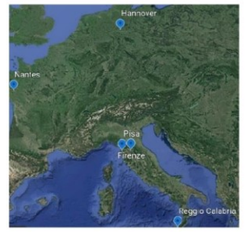
**Backgroud**

Which are the solutions to reduce noise in our cities? Are electric vehicles totally silent? How citizens can be involved in proactive good practices for noise reduction? These are some of the questions that the European LIFE E-VIA project aims to answer in depth.

Exposure data from the European Environment Agency demonstrate that more than 100 million EU citizens are affected by high noise levels negatively impacting human health. Traffic noise alone is harmful to the health of almost every third person in the World Health Organization European Region. 20% of Europeans are regularly exposed to night sound levels that could significantly damage health, especially in urban areas. The introduction of electric mobility is widely viewed as having the potential to reduce noise in urban areas, but the noise generated by tyres rolling on the road nevertheless needs careful study and further reduction.

Whitin this context, the project intends to:

- tackle noise pollution from road traffic noise focusing on a future perspective in which electric and hybrid vehicles will be a consistent portion of the flow;
- combine knowledge of road optimization and tyre development in order to test an optimized solution for reducing noise in urban areas and Life Cycle Cost with respect to actual best practices.




**Actions**

LIFE E-VIA started in July 2019 and will end in January 2023. The project is coordinated by the Municipality of Firenze and involves as partners the Mediterranean University of Reggio Calabria, Continental, Vie en.ro.se Ingegneria, University Gustave Eiffel and I-POOL. Specifically, the project has:

- built in Nantes a test road surface designed for the specific context of electric vehicles (EVs) and their tyres. Different EV types have been tested on this surface, with different tyre types per vehicle, to identify the optimal combination for noise reduction. An internal combustion engine vehicle has been used as reference;
- carried out further testing in a pilot area in Florence (Via Paisiello), with the construction of two road surfaces, an optimised and a reference one.

On-going activities:

- estimation of the noise mitigation efficiency and potential of tyres, road surfaces and traffic through a life-cycle and a life-cycle cost analysis;
- calculation of rolling noise coefficients according to the EU CNOSSOS model for the EV fleet in order to define guidelines on the application of the project's results;
- involvement of citizens through targeted information initiatives on electric and sustainable mobility and through soundwalks and interviews.

# LIFE HEATLAND PROJECT WORKSHOP "URBAN HEAT ISLAND AND NOISE: OUR NOT SO INVISIBLE ENEMIES"

**Issued on: November 2021**

**By: Comune di Firenze**

**EVENTS**

Code: E_5

HEATLAND

## URBAN HEAT ISLAND AND NOISE: OUR NOT SO INVISIBLE ENEMIES

**17th November 2021 17:00h CET - Online**

**17:00** Welcome.

*Vladimir Gumilar. Director at Construction Cluster of Slovenia.*

**17:10** Cool Pavements for Future Cities. Bye Bye Heat & Noise. **LIFE HEATLAND** project.

*Francisco Miguel Moral. Head of Energy and Insulation Area, CTCON.*

**17:30** Fight against noise and heat in the city. **LIFE COOL & LOW NOISE IMPACT** project.

*Giulia Custodi. Environmental Health Impact Division, Paris City Council.*

*Mailys Chanial. Paris City Hall, Water and Sanitation &. Roads and Traffic Divisions.*

**18:00** Reducing noise for roads inside very populated urban areas. **LIFE E-VIA** project.

*Arnaldo Melloni. Environmental Management, Municipality of Florence.*

**18:30** Cool pavement technology in Arizona. **CITY OF PHOENIX COOL PAVEMENT** Program.

*Ryan Stevens. PE, Civil Engineer III, City of Phoenix Street Transportation Department.*

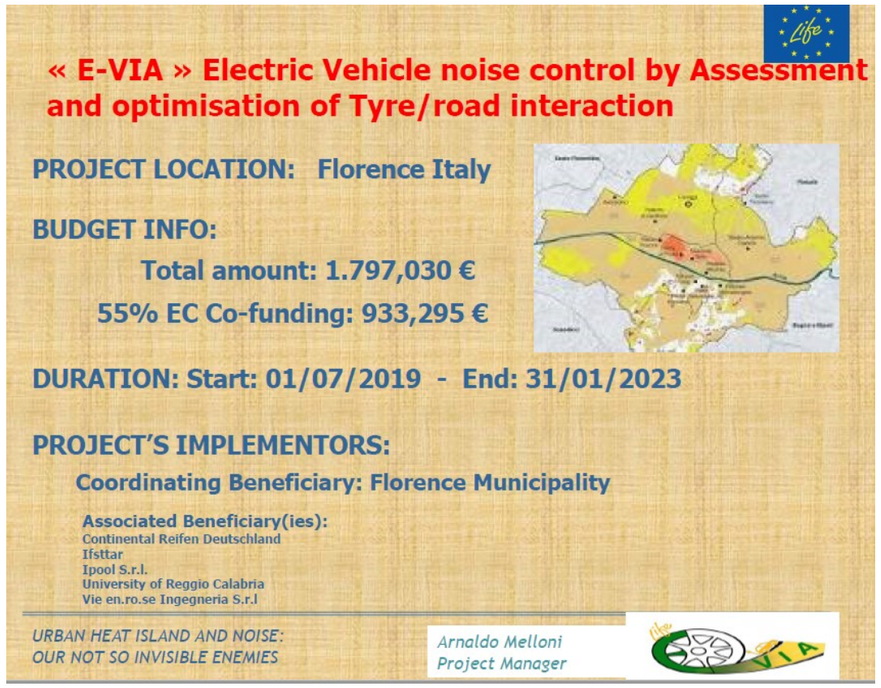
*Rubben Lolly. PE, CCPM, Special Projects Administrator, City of Phoenix Street Transportation Department.*

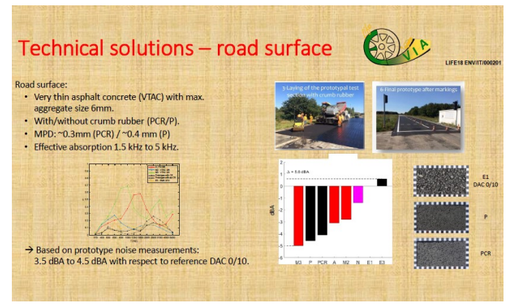
**19:00** Cooling LA's Neighborhoods. **COOL STREETS LA** program.

*Greg Spotts. Assistant Director and Chief Sustainability Officer StreetsLA.*

**19:30** Closure

**Click here for registration**




# Paper submitted to EURONOISE 2021

**Issued on: October 2021**

**By: Universitè Gustave Eiffel, UNIRC, IPOOL**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_14

euronoise 2021
25th to 27th of October
Madeira, Portugal - online

## Acoustical characterization of low-noise prototype asphalt concretes for electric vehicles


**Julien Cesbron[1], Simon Bianchetti[2], Marie-Agnès Pallas[2], Filippo G. Praticò[3], Rosario Fedele[3], Gianfranco Pellicano[3], Antonino Moro[4], Francesco Bianco[4]**

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**Abstract**

The paper deals with the acoustical characterization of low-noise asphalt concretes developed for noise reduction in urban areas within the LIFE E-VIA project (LIFE18 ENV/IT/000201). With the perspective of an increasing number of electric vehicles (EVs) in urban area, the asphalt concrete mixes have been optimized considering Life Cycle Cost with respect to actual best practices. Two very thin asphalt concretes (VTAC) of 6 mm maximum aggregate size have been implemented on a reference test track in France. Both are based on the same formulation, but one mix contains 1.9% crumb rubber by weight. The noise performance of these prototype test sections has been evaluated by means of close-proximity (CPX) tests and controlled pass-by (CPB) noise measurements for two EV models. CPX results have shown a noise reduction of about 3 dB(A) by comparison with a reference dense asphalt concrete 0/10, while an average pass-by noise reduction of about 4 dB(A) has been observed for the sample of EVs tested.



**Keywords:** electric vehicles noise, tyre/road noise, low-noise asphalt concrete, life cycle analysis.

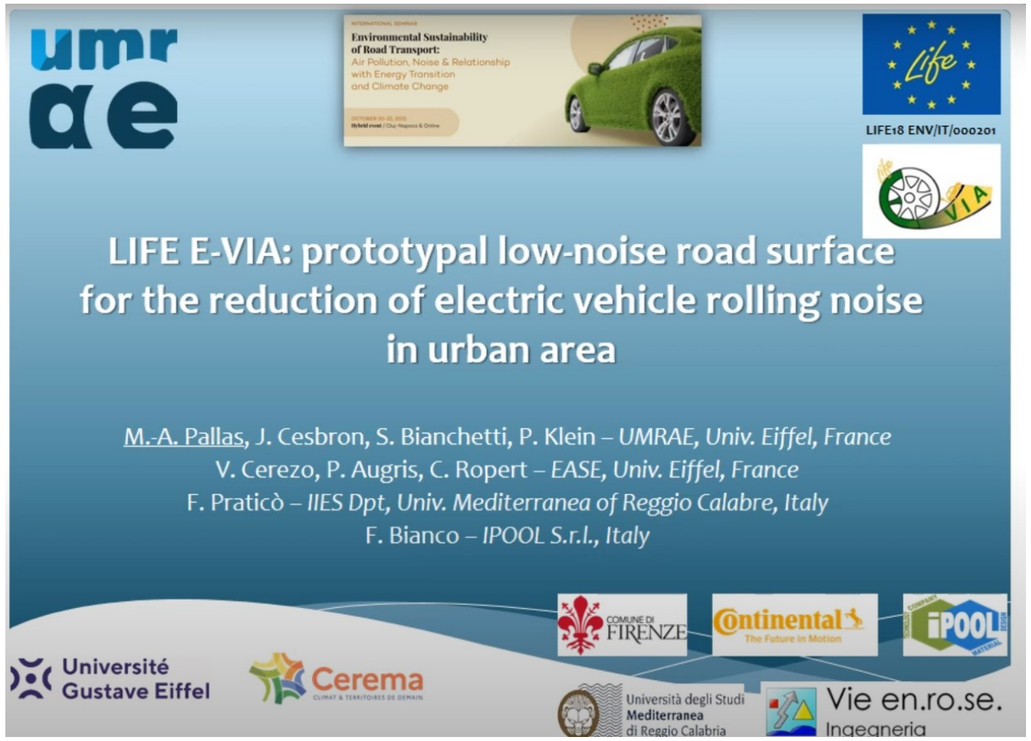
# Abstract/ presentation submitted to PIARC International Sustainability of Road Transport

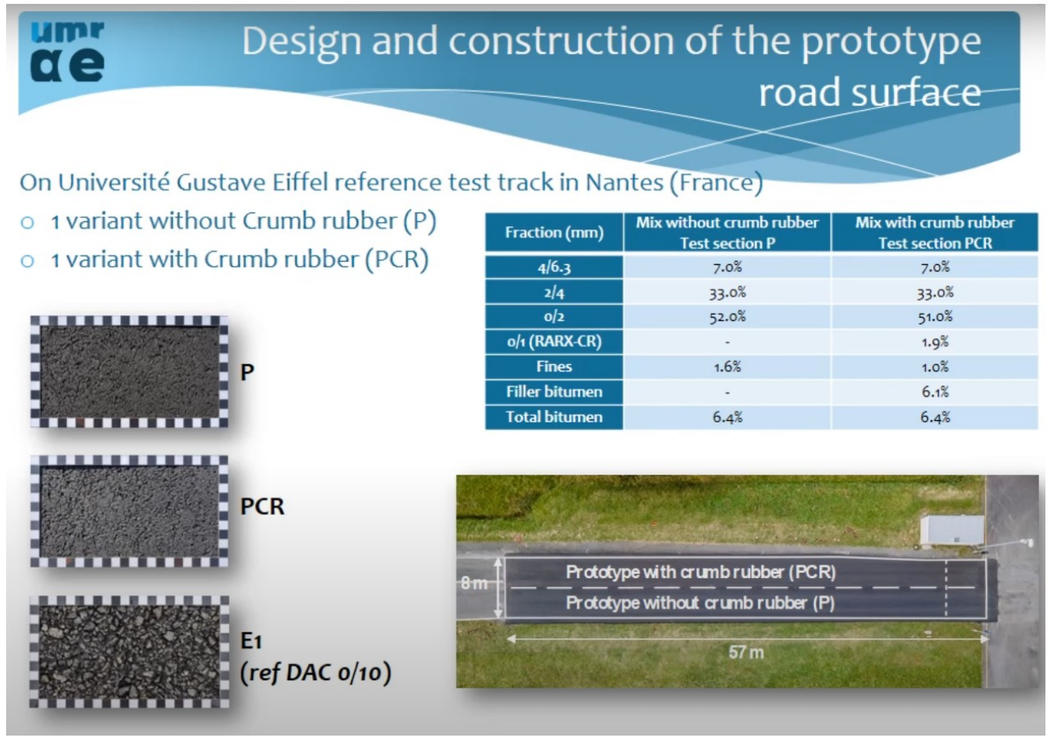
**Issued on: October 2021**

**By: Università Gustave Eiffel, UNIRC, IPOOL**

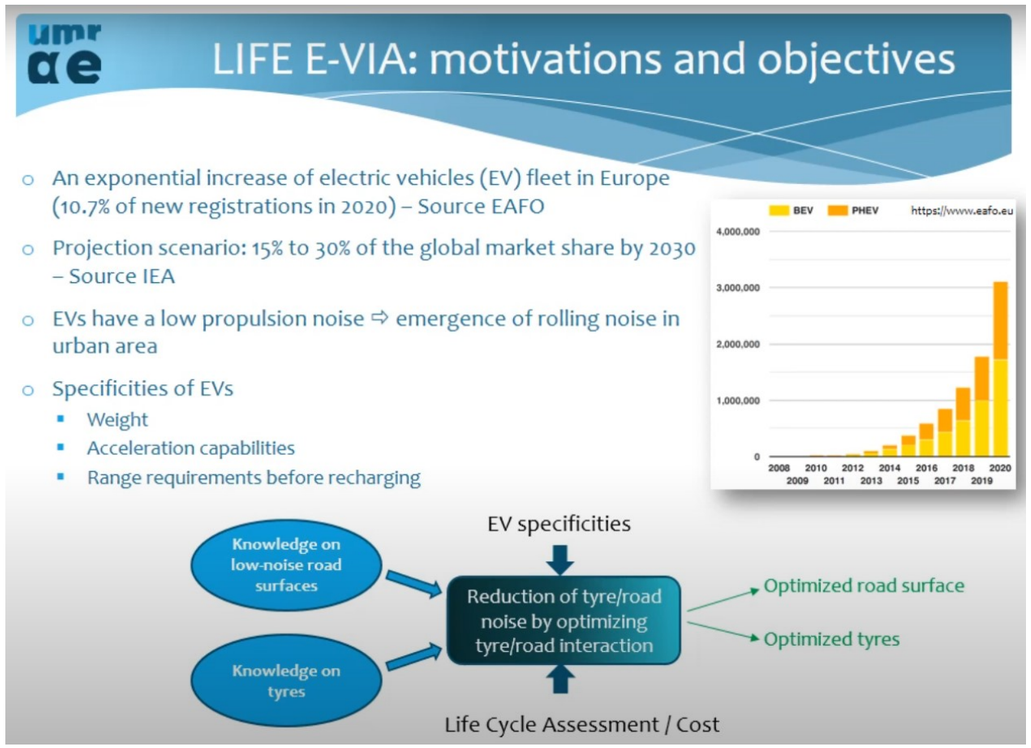
Deadline: 31/01/2023

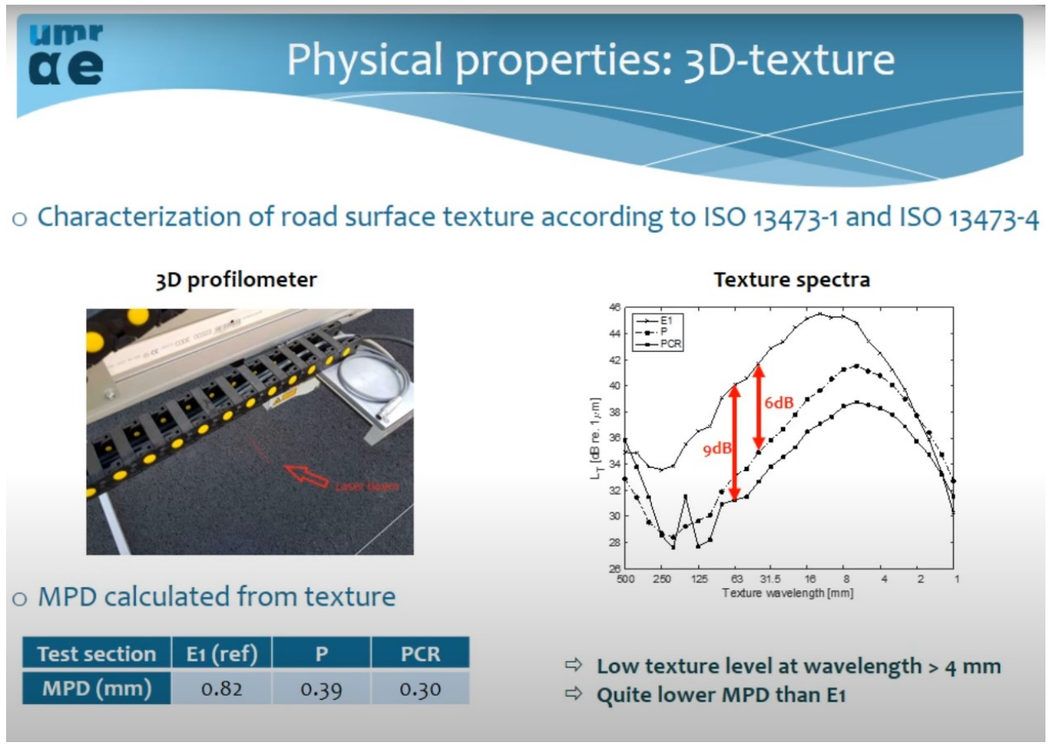
**SCIENTIFIC PAPERS**
Code: 36_15




| Fraction (mm) | Mix without crumb rubber Test section P | Mix with crumb rubber Test section PCR |
|---|---|---|
| 4/6.3 | 7.0% | 7.0% |
| 2/4 | 33.0% | 33.0% |
| 0/2 | 52.0% | 51.0% |
| 0/1 (RARX-CR) | - | 1.9% |
| Fines | 1.6% | 1.0% |
| Filler bitumen | - | 6.1% |
| Total bitumen | 6.4% | 6.4% |




| Test section | E1 (ref) | P | PCR |
|---|---|---|---|
| MPD (mm) | 0.82 | 0.39 | 0.30 |

# Paper submitted to EURONOISE 2021
# "Low-noise road mixtures for electric vehicles"

**Issued on: October 2021**

**By: UNIRC**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_16

euronoise 2021 25th to 27th of October Madeira, Portugal - online

## Low-noise road mixtures for electric vehicles


**Filippo G. Praticò[1], Gianfranco Pellicano[1] and Rosario Fedele[1]**

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filippo.pratico@unirc.it; gia.pellicano@gmail.com; rosario.fedele@unirc.it



**Abstract**

The road pavements of the future should be designed to take into account the variation of the traffic noise due to traffic increase and electric vehicles (EVs) diffusion. Indeed, EVs are very different from internal combustion engine vehicles. Importantly, they could be quieter than traditional vehicles at low frequencies, but could be noisier at high frequencies. This study aims at presenting the acoustic and mechanical performance of two asphalt concretes that were designed to reduce the problem mentioned above. In more detail, an experimental investigation was carried out to test samples of asphalt concretes with low nominal maximum aggregate sizes, with and without crumb rubber, added applying the dry method. A gyratory compactor was used to make the samples and acoustic and mechanic properties were tested. Results show that mechanistic-related strategies such as the addition of crumb rubber could improve the acoustic performance. Consequently, there is probably room for improving design criteria.



**Keywords:** traffic noise, electric vehicles, low-noise road mixtures, acoustic and mechanical performances, crumb rubber.




## Task 2) Design/creation of mixtures/samples with and without TCR (1/1)

- Based on the Superpave mix design method, the optimum %B was 5%. Hence, three percentages of bitumen per mix type were considered (about 3%, 5%, and 7%).
- The gyratory compactor revolution number was maintained constant (i.e., 210).
- The TCR was added applying the dry process. TCR seems to negatively affect the compaction level of the samples (cf. $G_{mb\_DIM}$). Hence, %TCR = 2.

Table 2 – Samples' compaction and features.

| Type of mixture | Sample ID | Bitumen by mix weight [%] | TCR by mix weight [%] | Gyratory compactor revolution number | Sample dimensions (thickness × diameter) [mm × mm] | Sample weight [g] | $G_{mb\_DIM}$ [-] |
|---|---|---|---|---|---|---|---|
| AC6* | AC6o_3%B_0%TCR_21 | 3.2 | 0.0 | 210 | 117.4 × 97.5 | 2066.09 | 2.36 |
| AC6* | AC6o_5%B_0%TCR_22 | 5.2 | 0.0 | 210 | 117.2 × 97.5 | 2109.57 | 2.41 |
| AC6* | AC6o_7%B_0%TCR_23 | 7.2 | 0.0 | 210 | 119.6 × 97.5 | 2154.78 | 2.41 |
| AC6** | AC6o_3%B_2%TCR_24 | 3.0 | 2.0 | 210 | 123.7 × 97.5 | 2105.22 | 2.28 |
| AC6** | AC6o_5%B_2%TCR_25 | 5.0 | 2.0 | 210 | 107.0 × 97.5 | 2151.30 | 2.39 |
| AC6** | AC6o_7%B_2%TCR_26 | 7.0 | 2.0 | 210 | 123.9 × 97.5 | 2198.26 | 2.36 |

**Symbols.** AC6 = Asphalt Concrete with Nominal Maximum Aggregate Size of 6 mm. 3%B = Percentage of bitumen of 3% (w/w by the total weight of the mixture). 0%TCR = Percentage of TCR of 0%. $G_{mb\ DIM}$ = Bulk Specific Gravity calculated considering the characteristics of the sample (dimensions and weight).

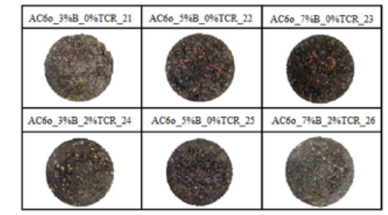



Figure 1 – Upper surfaces of samples.





## Task 4) Analysis of the results (5/5)


Figure 4 – Road Acoustic Response (RAR) spectra.

Figure 5 – Road Acoustic Response (RAR) 1/3 octave band spectra.

MI [Ns/m] | K [N/m] | RAR [Pa] Octave bands | RAR [dB] Octave bands | RAR [Pa] 1/3 Octave bands | RAR [dB] 1/3 Octave bands





## Task 3) Testing of samples with and without TCR (1/1)

- Six samples (with or without TCR) were tested using the devices in Figure 2.
- The method and the system used to measure both mechanical and acoustic responses were developed by the authors of the paper.

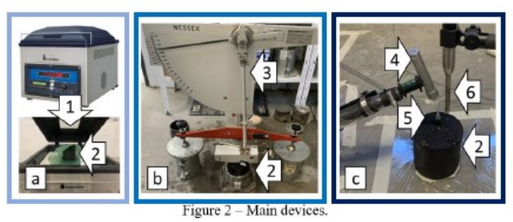



Figure 2 – Main devices.

Notes. 1: Corelok machine. 2: Samples. 3: Pendulum tester. 4: Impact hammer. 5: Accelerometer. 6: Microphone.

Legend: Test → Parameter

a → $G_{mb\_Corelok}$

b → PTV

c → K = Force/Displacement;
MI = Force/Velocity;
RAR = Acoustic response to an impact hammer hit.

# LIFE E-VIA: laboratory experiments (IT)

**Issued on: December 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_3

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

## LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/road interaction

***Progettazione della miscela***

L'Università 'MEDITERRANEA' di Reggio Calabria (UNIRC) ha analizzato più di 150 soluzioni presenti in letteratura (*strati di usura*), basandosi su *performance* acustiche e non-acustiche, con l'obiettivo di selezionare le soluzioni più appropriate. Sono stati considerati le caratteristiche e gli impatti di ogni soluzione, e sono stati condotti dei test preliminari. Da un totale di 150 conglomerati bituminosi, sono state selezionate nove miscele, sulla base delle seguenti caratteristiche: 1) Risposta Acustica; 2) "Durata di vita", facendo riferimento alle attività Meccaniche; 3) Permeabilità; 4) Frizione; 5) Valore ENDT. Sulla base di queste caratteristiche, sono stati selezionati conglomerati bituminosi con aggregato massimo nominale di 6 mm (AC6).
Un accurato piano di esperimenti ha permesso di progettare e validare le miscele scelte. Infine sono state progettate e testate due tipologie di miscele (AC6 con e senza polverino di gomma).

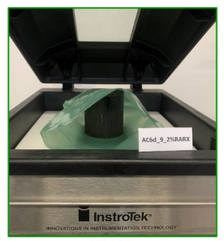
***Compattazione metodo Superpave***

***Esperimenti di Laboratorio***

Resistenza al flusso d'aria

Assorbimento Acustico

Impedenza meccanica




Corelok

Permeabilità


Skid Test


Sand Patch Test

Stabilità Marshall

Sito web: https://life-evia.eu/

# LIFE E-VIA: survey ante/post operam (IT)

**Issued on: December 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_4

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

***Il Caso Pilota***

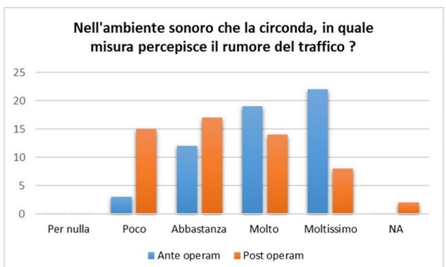
Nella seconda metà del mese di luglio 2021 sono stati realizzati gli interventi nel caso pilota di via Paisiello (Firenze): su un tratto di strada è stato steso un innovativo asfalto a bassa emissione sonora per ridurre l'inquinamento acustico. Al fine di valutare la percezione dei cittadini, prima e dopo la realizzazione dei lavori, sono stati somministrati questionari ai residenti nel tratto di strada interessato. Ad inizio luglio, sono stati consegnati 92 questionari ante-operam, di questi, 56 sono stati restituiti compilati. Successivamente alla realizzazione dei lavori (settembre), sono stati consegnati 101 questionari post-operam, dei quali 56 sono stati riconsegnati compilati. L'analisi dei dati mostra che la stesa dell'asfalto a bassa emissione acustica ha avuto un impatto positivo per quanto riguarda la percezione del rumore. In particolare, il 77% degli intervistati ha valutato in maniera positiva gli effetti dell'asfalto sviluppato dal progetto sulla riduzione del rumore causato dal traffico.

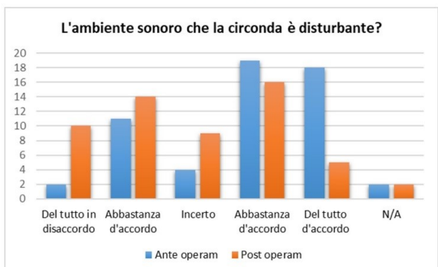
***Contesto e strumento metodologico***


*Il caso pilota a Firenze*

*Questionari ante-operam*

***Analisi dei dati***






Sito web: https://life-evia.eu/

# LIFE E-VIA: survey ante/post operam (EN)

**Issued on: December 2021**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_5

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

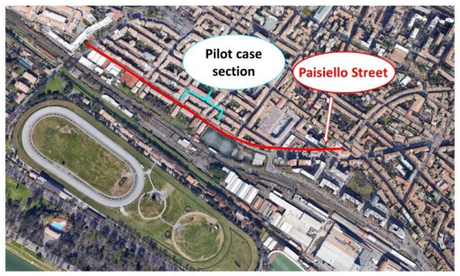
LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

***The Pilot case***

The interventions in the pilot case located in Paisiello street (Florence) have taken place in mid July 2021: an innovative low-noise asphalt that aims to reduce traffic noise pollution was laid down in a portion of the street. In order to evaluate citizens soundscape perception before and after the pilot intervention realization, ante-operam and post-operam questionnaires were submitted to Paisiello street's residents. In particular, 92 ante-operam questionnaires were delivered, and 56 completed questionnaires were returned. In September, 101 post-operam questionnaires were delivered and 56 returned. The analysis shows a positive subjective impact of the low-noise asphalt implementation. As an illustration, according to 77% of the respondents the re-paving reduced the traffic noise perceived in their home.

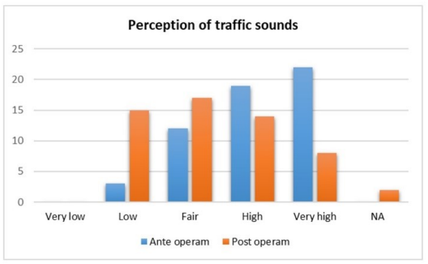
***Context and Methods***

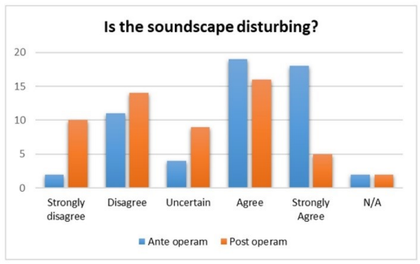


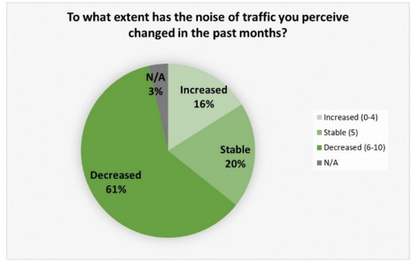

*The pilot case in Florence*

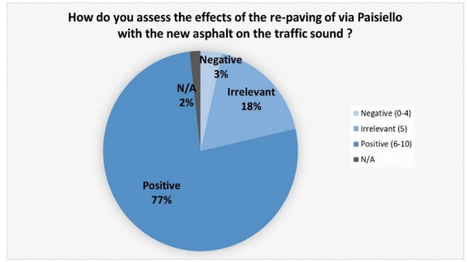
*Delivered Questionnaires*

***Survey' Analysis***




Website: https://life-evia.eu/

# LIFE E-VIA: laboratory experiments (DE)

**Issued on: December 2021**

**By: Continental**

Deadline: 31/12/2022

**NOTICEBOARD IN GERMAN LANGUAGE**

Code: 22_3

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

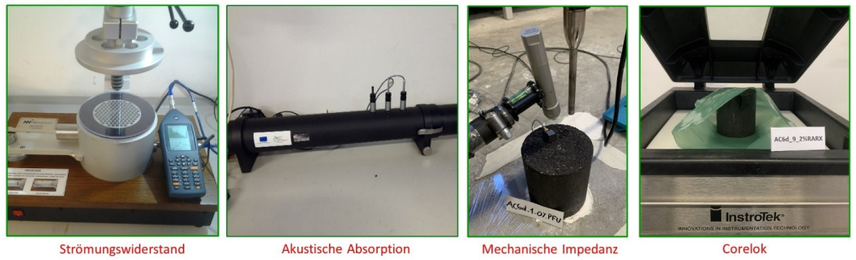
Mit Unterstützung des LIFE-Förderprogramms der Europäischen Union

***Mischungs-design***

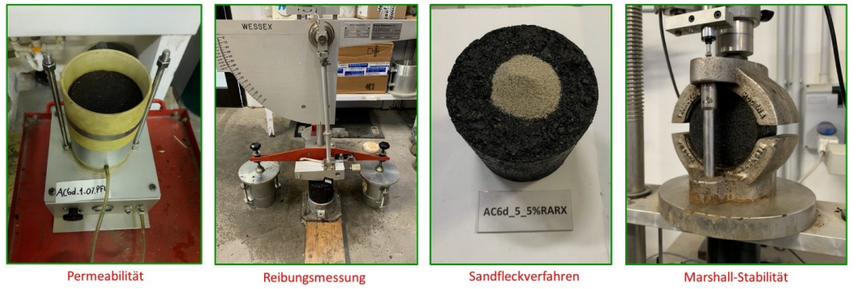
Die Università Mediterranea Di Reggio Calabria (UNIRC) hat zur Findung eines optimalen Straßenbelags mehr als 150 in der einschlägigen Literatur erwähnte Deckschichten auf ihre akustischen und nicht-akustischen Leistungsfähigkeiten untersucht. Weiterhin wurde die Umweltverträglichkeit berücksichtigt und eine Reihe von Vortests durchgeführt. Auf dieser Basis wurden von den 150 Vorschlägen neun Asphaltbetonmischungen ausgewählt, wobei besonderer Fokus auf (1) die akustischen Eigenschaften; (2) die auf Basis der mechanischen Eigenschaften zu erwarteten Lebensdauer; (3) die Permeabilität; (4) die Friktionseigenschaften; und (5) den $END_T$-Wert (gemäß ISO 10844) gelegt wurde. Aus diesen wurden dann Asphaltbetonmischungen mit einer maximalen nominalen Korngröße von 6 mm (AC6) ausgewählt. Mittels einer detaillierten Reihe von Experimenten wurden schließlich die finalen zwei Mischungen entwickelt und validiert. Es handelt sich dabei um zwei AC6-Mischungen mit/ohne Gummigranulatanteil.

***Asphaltbeton-verfestigung***

***Labor-experimente***




Strömungswiderstand | Akustische Absorption | Mechanische Impedanz | Corelok




Permeabilität | Reibungsmessung | Sandfleckverfahren | Marshall-Stabilität

Webseite: https://life-evia.eu/

# LIFE E-VIA: laboratory experiments (FR)

**Issued on: January 2022**

**By: Universitè Gustave Eiffel**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 21_3

LIFE E-VIA

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

**Contrôle du bruit des Véhicules Électriques par l'évaluation et l'optimisation de l'interaction pneumatique/chaussée**

***Conception du mélange***

L'Université « méditerranéenne » de Reggio de Calabre (UNIRC) a analysé plus de 150 solutions de surface routière disponibles dans la littérature, sur la base de leurs performances acoustiques et non acoustiques, pour sélectionner les solutions pertinentes. Leurs caractéristiques et impacts ont été considérés et des tests préliminaires ont été effectués. À partir des 150 bétons bitumineux, neuf formulations ont été retenues, selon de nombreux critères incluant : 1) la réponse acoustique; 2) la durée de vie relativement aux propriétés mécaniques; 3) la perméabilité; 4) l'adhérence; 5) la valeur ENDT (« Expected pass-by Noise level Difference from Texture level variation of the road surface »).
Pour cette dernière, des bétons bitumineux ouverts de taille nominale de granulats 6 mm (AC6) ont été retenus.
Un plan d'expérience précis a été élaboré et appliqué pour concevoir et valider la formulation définitive. Deux variantes ont finalement été réalisées et testées (AC6 avec et sans poudrette de caoutchouc).

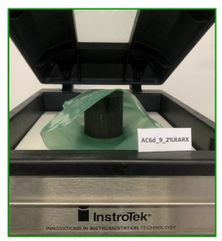
***Compactage Superpave***

***Tests en laboratoire***

Résistance au passage de l'air

Absorption acoustique


Impédance mécanique




Corelok


Perméabilité


Essais d'adhérence


Mesure de la tache au sable

Stabilité Marshall

Site web: https://life-evia.eu/

# LIFE E-VIA: Tyre role in the context of EV and ICEV (EN)

**Issued on: January 2022**

**By: Continental**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_6

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

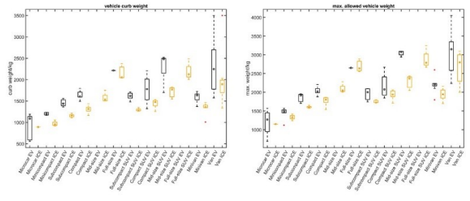
***Tyre role in the context of EV and ICEV***

Electric vehicles (EV) differ from their traditional internal combustion engine (ICEV) counterparts in many technical or design features. Some of these changes can influence the rolling noise created by the interaction of the tyre with the road. These parameters are for example increased vehicle loads due to the battery weight which is necessary to provide acceptable mileage, special acceleration/deceleration behaviour due to the different torque characteristic of electrical motors and the recuperation, possible new tyre size trends ("tall-and-narrow") being introduced for mileage, handling or aesthetic reasons, etc. In an analysis of the current and future European EV market it has thus been assessed whether there are systematic differences between EVs and ICEVs which would affect tyre/road noise by any of the previously described mechanisms.

***Vehicle weight***

**Background:** Commonly, an increase in tyre load can be associated with an increase in tyre/road noise. While the extend of this load influence on rolling noise depends on tyre type, speed, road surface and inflation pressure, an increase in SPL of 0.5 dB to 2.5 dB per load doubling is typically reported in literature. If an increase in tyre loads necessitates an increase in tyre inflation pressure or tyre construction, further negative effects on tyre/road noise can be expected.

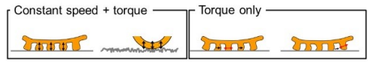
**Observations:** The results indicate that on average EVs are between 20 % and 25 % heavier than ICEVs in curb weight and roughly 10 % to 15 % in maximum weight. This will negatively influence tyre/road noise generation. Often this is accompanied by an increase in tyre inflation pressure – either for load carrying or rolling resistance reasons – which will further increase rolling noise.

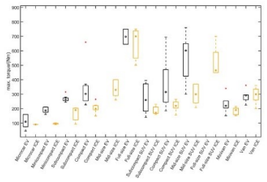



***Vehicle torque***

**Background:** Compared to constant speed driving, tyre torque due to acceleration or braking can increase tyre/road noise by several dB. Again, the extend of this increase depends highly on tyre design and operating conditions. This noise increase is caused by micro-scale adhesion and friction mechanisms which are responsible for phenomena like stick/slip and stick/snap which lead to additional tangential vibrations of the tread blocks which are of minor importance under free rolling.

**Observations:** Definite conclusions regarding EV tyre torque are difficult because of a lack of specific data and the large influence of electronic control systems and driving behaviour. Engine torque is in nearly all cases higher for EVs, both in terms of maximum torque as well as the RPM range where this is available. Assuming similar vehicle control systems and driving behaviour to ICEVs this means that tyre torque is potentially also higher for EVs. Combined with reports that over a third of EV fleet users exhibit a more aggressive driving behaviour a worst-case assumption of increased tyre torque for EVs seems reasonable.

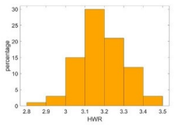


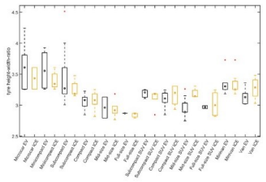

***Tyre sizes***

**Background:** The sound radiation from the area close to the tyre/road contact patch is amplified by the horn-like geometry formed between tyre and road. This amplification is frequency dependent with average amplifications of 5 dB to 12 dB per third-octave band having been reported for complex pass-by situations. The amplification is strongly affected by tyre width, with smaller tyres reducing the amplification effect. Tall-and-narrow tyre concepts as used by some EVs (e.g. BMW i3) have a significant influence on the amplification from the horn effect, affecting both the frequency and the amplitude of the peak amplification.

**Observations:** New tyre size concepts, for example tall-and-narrow, are not widely employed for EVs. Contrary, for EVs based on an ICEV platform usually no changes in tyre size are observed. For new EV platforms often only slight adjustments in tyre sizes are noticeable, typically in form of a small increase in tyre diameter and/or width. The relation between tyre height and width, defined here as height-width-ratio $HWR = \text{tyre diameter/tyre width}$, which is important for the amplification of the sound radiation, mostly stays in the same range as established for classical ICEV applications.




Height-width-ratio for the typical tyre sizes used by the 50 most sold ICEVs in the European market in 2019.




Web site: https://life-evia.eu/

# LIFE E-VIA: Tyre role in the context of EV and ICEV (DE)

**Issued on: January 2022**

**By: Continental**

Deadline: 31/12/2022

**NOTICEBOARD IN GERMAN LANGUAGE**

Code: 22_4

LIFE18 ENV/IT/000201

Mit Unterstützung des LIFE-Förderprogramms der Europäischen Union

LIFE E-VIA

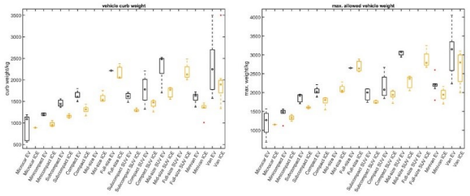
Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

## *Die Rolle des Reifens im Kontext des Wechsels von ICEVs zu EVs*

Elektrofahrzeuge (EV) unterscheiden sich von ihren Gegenstücken mit Verbrennungsmotor (ICEV) in vielen Technik- und Designaspekten. Einige dieser Unterschiede können einen Einfluss auf das durch die Reifen-/Fahrbahninteraktion verursachte Rollgeräusch haben. Dabei handelt es sich z.B. um erhöhte Fahrzeuglasten aufgrund des für akzeptable Reichweiten nötigen Batteriegewichtes; spezielles Beschleunigungs-/Bremsverhalten aufgrund der speziellen Drehmomenteigenschaften von elektrischen Motoren und der Rekuperation; oder neue Reifengrößen (*tall-and-narrow*) welche aus Gründen der Reichweite, des Handlings oder der Ästhetik eingeführt werden. In einer Analyse des europäischen EV Marktes wurde deswegen untersucht, inwieweit es systematische Unterschiede zwischen EVs und ICEVs gibt, die das Reifen-/Fahrbahngeräusch durch die genannten Mechanismen beeinflussen können.

### *Fahrzeug-gewicht*

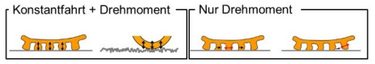
**Ausgangslage:** Eine erhöhte Reifenlast kann mit einer Zunahme des Reifen-/Fahrbahngeräusches in Verbindung gebracht werden. Der Umfang dieses Lasteinflusses hängt u.a. vom Reifen, dem Fülldruck, der Geschwindigkeit und dem Straßenbelag ab. In der Literatur wird typischerweise eine Zunahme des Gesamt-schalldruckpegels um 0,5 dB bis 2,5 dB pro Lastverdopplung berichtet. Falls eine Erhöhung der Reifenlast auch einen erhöhten Fülldruck oder eine geänderte Reifenkonstruktion verlangt, ist mit einer weiteren Zunahme des Rollgeräusches zu rechnen.

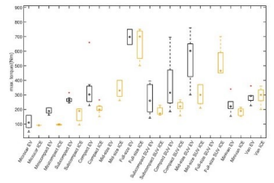



**Beobachtung:** Die Ergebnisse zeigen, dass EVs im Durchschnitt ein 20 % bis 25 % höheres Leergewicht als ICEVs haben und ein etwa 10 % bis 15 % höheres Maximalgewicht. Dies hat einen negativen Einfluss auf das Reifen-/Fahrbahngeräusch. Oftmals liegt zusätzlich – aus Gründen der Lastkapazität oder der Reichweite – ein erhöhter Fülldruck vor, durch den das Rollgeräusch potenziell weiter zunimmt.

### *Drehmoment*

**Ausgangslage:** Im Vergleich zur Konstantfahrt kann ein Reifendrehmoment durch Beschleunigung oder Bremsen das Rollgeräusch um mehrere dB(A) erhöhen. Der Umfang dieser Zunahme hängt wiederum vom Reifendesign und den Betriebsbedingungen ab. Verursacht wird diese Zunahme durch kleinskalige Adhäsions- und Friktions-prozesse welche zu Phänomenen wie stick/slip oder stick/snap führen. Diese erzeugen zusätzliche tangentiale Vibrationen der Profilblöcke, die unter freien Rollen nur von geringer Bedeutung sind.



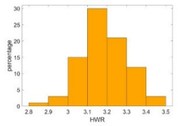




**Beobachtung:** Aufgrund mangelnder Daten zum EV-Reifendrehmoment, und des Einflusses von elektrischen Kontrollsystemen und dem Fahrverhalten ist eine konkrete Aussage schwierig. Das Motordrehmoment ist für EVs nahezu immer höher, sowohl als Maximalwert als auch als Umdrehungszahlbereich in dem dieser erreicht wird. Wird von ähnlichen Kontrollsystemen und zumindest nicht deutlich passiverem Fahrverhalten ausgegangen, bedeutet dies, dass das Reifendrehmoment von EVs mit großer Wahrscheinlichkeit auch höher ist.

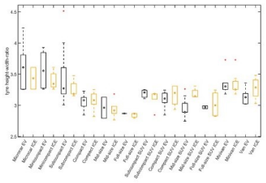
### *Reifengröße*

**Ausgangslage:** Die Schallabstrahlung aus der unmittelbaren Umgebung des Reifen-/Fahrbahnkontaktes wird durch die einem Horn ähnelnde Geometrie zwischen Reifen und Fahrbahn verstärkt. Für diese frequenzabhängige Verstärkung sind für komplexe Vorbeifahrtsituationen Erhöhungen von 5 dB bis 12 dB pro Terzband beobachtet worden. Der Effekt hängt stark von der Reifenbreite ab, wobei schmalere Reifen zu einer geringeren Erhöhung führen. Tall-and-narrow Reifenkonzepte, wie sie von einigen EVs (z.B. BMW i3) genutzt werden, haben einen signifikanten Einfluss auf die verstärkte Schallabstrahlung durch den Horneffekt. Dabei wird sowohl die maximale Verstärkung als auch der relevante Frequenzbereich beeinflusst.

**Beobachtung:** Neue Reifengrößenkonzepte, z.B. tall-and-narrow, werden nicht in großen Umfang von Evs benutzt. Im Gegenteil, für EVs die auf klassischen ICEV-Plattformen basieren, ist im Normalfall keine Änderung der Reifengröße zu beobachten. Für neue EV-Plattformen ergeben sich oftmals nur geringe Anpassungen der Reifendimensionen, typischerweise in Form einer leichten Zunahme von Reifenbreite und/oder Felgendurchmesser. Das Verhältnis zwischen Reifenhöhe und –breite, hier definiert als height-width-ratio $HWR = \text{Reifendurchmesser}/\text{Reifenbreite}$, welches für die Verstärkung der Schallabstrahlung von Bedeutung ist, liegt Größtenteils im selben Bereich wie für klassische ICEVs.




Height-width-ratio für die typischen Reifengrößen, die von den 50 meist-verkauften Fahrzeugen auf dem europäischen Markt in 2019 benutzt wurden.




Webseite: https://life-evia.eu/

# Paper published in an open access journal
# NOISE MAPPING
**Issued on: December 2021**
**By: UNIRC**
Deadline: 31/12/2022

**ARTICLES FOR OPEN ACCESS JOURNAL**
Code: 20_2

DE GRUYTER Noise Mapp. 2021; 8:281–294

Research Article

Filippo Giammaria Praticò and Rosario Fedele*

# Electric vehicles diffusion: changing pavement acoustic design?

https://doi.org/10.1515/noise-2021-0023
Received May 11, 2021; accepted Oct 31, 2021

**Abstract:** Electric vehicles (EVs) are progressively entering into the current noisy urban ecosystem. Even though EVs are apparently quieter than traditional Internal Combustion Engine Vehicles (ICEVs), they have an impact on noise maps and road pavement designers should take this into consideration when designing future low-noise road pavements. Consequently, the main objective of this study is to define what are the most important aspects that road pavement designers should take into account. For this reason, in this paper, the noise emitted by EVs was analysed, considering parameters (*e.g.*, speed and frequency) and comparisons, in order to identify crucial characteristics. Results show that EV noise could call for the improvement of pavement acoustic design due to the Acoustic Vehicle Alerting System (AVAS), high-frequency peaks, and noise vibration harshness.

**Keywords:** Internal combustion engine vehicles, Electric vehicle, Traffic noise, Road pavement design

## 1 Introduction

We tend to think that Electric vehicles (EVs) are quite silent, but it was amply proved that electric motors can emit noise [1]. The advent of EVs into the current traffic-noise-related ecosystem can be compared to the introduction of a new species in a given ecosystem [2], which need to be studied considering different points of view, *i.e.*, of authorities, pedestrians, drivers, and designers. Hence, designers should consider the impact of EVs on noise maps (especially in urban contexts), and take this into consideration when designing future low-noise road pavements [3].

The first outcome of the studies mentioned above refers to the "excessive quietness" of EVs, especially at low speeds, *e.g.*, Sound Pressure Levels lower than 56 dB @about 10 km/h, cf. also [4]. This may affect the safety of pedestrians, riders, and Internal Combustion Engine Vehicles (ICEVs) drivers [4–6]. In order to solve this problem, regulation and systems have been proposed as discussed in the following (see Section 1.3).

Another important aspect related to the noise produced by vehicles (including EVs) is the tire/road interaction. Hence, solutions related to tires and roads were proposed.

Focusing on tires designed for EVs, Ejsmont *et al.* (2015) [7] concluded that these special tires generate noise similar to general use tires, and that a small noise reduction can be possible if narrow tires with big outer diameter are used. In 2016, Pallas *et al.* (2016) and Czuka *et al.* (2016) [8, 9], within the FOREVER project, investigated the tire/road noise of EVs, and the "low-noise tires" concept (using one EV and nine different tire sets) concluding that:

1. The rolling noise of light EVs does not differ from the one of conventional vehicles.
2. Ecological tires (*i.e.*, which reduce consumption) and current tires for EVs do not reduce significantly the rolling noise.

Mohammadi and Ohadi (2021) [10] proposed a novel approach to design quiet tires, based on multi-objective minimization of generated noise. In this latter study, all the predominant mechanisms related to tire/road noise (texture impact, tread impact, air pumping, pipe resonance, Helmholtz resonance, air cavity resonance, and horn effect) were included in the model. On average, this allowed reducing of about 2 dB(A) the total noise (corresponding to 80% reduction of the normalized texture impact noise), and of 27% the average normalized sound of a patterned tire, by modifying of about the 10% its structural and tread pattern parameters.

For quiet asphalt pavements, it is important to point out that their sound absorption can be modelled [11, 12] and measured using in-lab and on-site methods [13]. Furthermore, road sound absorption is related to several parameters (*i.e.*, thickness, porosity, air flow resistivity, and tortuosity), and more attention should be paid on the im-

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https://www.degruyter.com/document/doi/10.1515/noise-2021-0023/html

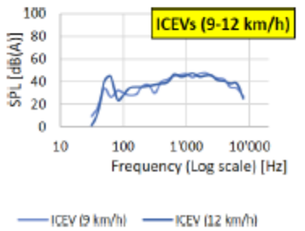


within the range 500 Hz–1.6 kHz, while for heavy EVs is within 630 Hz and 2.5 kHz).
5. Based on measured data, the equivalent frequency (*i.e.*, the frequency, selected among all the center frequencies of 1/3 bands between 350 Hz and 2500 Hz, that is more often associated to the maximum A-weighted sound pressure level) of light EVs and light ICEVs is 1000 Hz and 800 Hz, respectively. While the same parameter for heavy EVs and heavy ICEVs is 1000 Hz and 630 Hz, respectively.
6. Simulations showed that if the percentage of EVs increases of 10%, the noise of the traffic flow decreases of 7 dB(A).

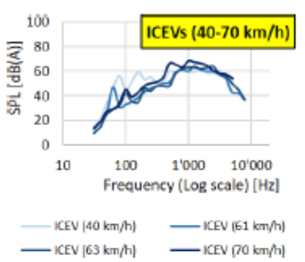
The following figures (Figures 3-5) show several noise spectra related to both light and heavy ICEVs and EVs [31, 32, 37, 45, 52]. In particular, these figures report the A-weighted Sound Pressure Level of:

1. ICEVs (see Figure 3) and EVs (see Figure 4), moving at different speeds (9–70 km/h), measured applying the Statistical Pass-By method (ISO 11819-1:1997).
2. EVs (see Figure 5) moving at constant speeds, derived applying the method described in the ISO 362-1-1:2015.

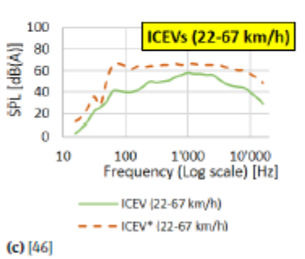
Note that the measurements related to heavy vehicles were pointed out by using asterisks.




(a) [31]

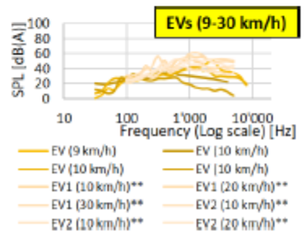



(b) [31, 32]

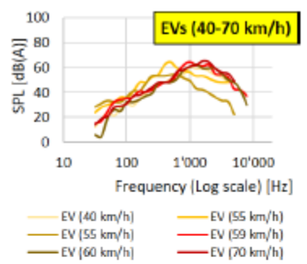



(c) [46]

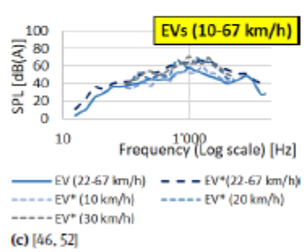
**Figure 3:** A-weighted Sound Pressure Level (Statistical Pass-By method, ISO 11819-1:1997) of ICEVs at different speeds (* – heavy vehicle) [31, 32, 45].




(a) [31, 32, 52]




(b) [31, 32]




(c) [46, 52]

**Figure 4:** A-weighted Sound Pressure Level (Statistical Pass-By method, ISO 11819-1:1997) of EVs at different speeds (* – heavy vehicle; ** – motorcycle) [31, 32, 45, 52].

# Presentation and paper to DAGA 2022

## "Reifeneinfluss auf das Reifen-/Fahrbahngeräusch unter Drehmoment"

**Issued on: March 2022**

**By: Continental, Universitè Gustave Eiffel**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_17

# Reifeneinfluss auf das Reifen-/Fahrbahngeräusch unter Drehmoment


Carsten Hoever[1], Achillefs Tsotras[1], Marie-Agnès Pallas[2], Julien Cesbron[3]

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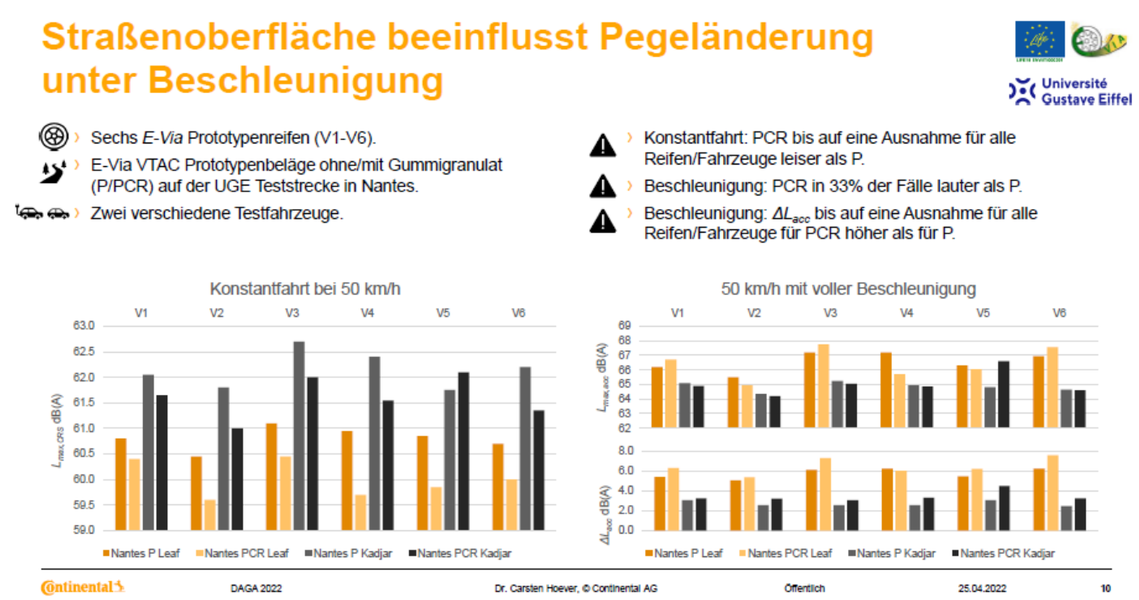
To be presented at: *DAGA 2022 – 48. Jahrestagung für Akustik, 21. – 24. März 2022, Stuttgart, Germany*



ABSTRACT

Übermäßiger Straßenverkehrslärm hat einen negativen Einfluss auf die menschliche Gesundheit in vielen Teilen Europas, vor allem in Städten. Die Einführung von Elektromobilität wird in diesem Zusammenhang oftmals als eine der besten Lösungen angesehen, die Lärmbelastung in urbanen Gebieten zu reduzieren. Für das Verkehrsgeräusch von Elektrofahrzeugen (EV) ergibt sich dabei im Vergleich zu klassischen Verbrennerfahrzeugen aufgrund der deutlichen Reduzierung des maskierenden Antriebsstranggeräusches eine erhöhte Bedeutung des Reifen-/Fahrbahngeräusches. Dieser Effekt wird unter Beschleunigung verstärkt. Einerseits ist bekannt, dass das Reifen-/Fahrbahngeräusch unter Drehmoment oftmals höher als im Zustand des freien Rollens ist. Andererseits fehlt bei EVs insbesondere in genau denjenigen Fahrzuständen, in denen es zu einem erhöhten Reifendrehmoment kommt, die Maskierung durch den Antriebsstrang, der bei klassischen Verbrennerfahrzeugen fast immer mit diesen Situationen einhergeht. Im Rahmen des LIFE E-VIA-Projektes soll der Straßenverkehrslärm in urbanen Umgebungen durch für EVs optimierte Straßenbeläge und Reifen reduziert werden. Aufgrund der angesprochenen Effekte muss dabei für eine wirksame Lärmreduzierung neben der Konstantfahrt auch beschleunigtes Fahren berücksichtigt werden. Daher wurde im E-VIA Projekt mittels Messungen am Rollenprüfstand und auf einer Teststrecke untersucht, welchen Einfluss unterschiedliche Reifen- und Betriebsparameter auf die Veränderung des Reifen-/Fahrbahngeräusches unter Drehmoment im Vergleich zur Konstantfahrt haben.





# LIFE E-VIA: OPTIMISATION DU BRUIT DE CONTACT PNEUMATIQUE/ CHAUSSEE POUR LES VEHICULES ELECTRIQUES (FR)

**Issued on: January 2022**

**By: Università Gustave Eiffel**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 21_4

*The poster is exposed in the Università Gustave Eiffel premises, Nantes.*

*A copy of the poster a copy of the poster will be exposed at the event "Assises Nationales de la Qualité de l'Environnement Sonore » organized in Lyon in September 2022.*

# Presentation and paper to CFA 2022

## "Influence du revêtement routier sur l'émission acoustique des véhicules électriques en milieu urbain"

**Issued on: April 2022**

**By: Universitè Gustave Eiffel**

Deadline: 31/01/2023

**SCIENTIFIC PAPERS**

Code: 36_18

**Influence du revêtement routier sur l'émission acoustique des véhicules électriques en milieu urbain**

Julien Cesbron[a], Marie-Agnès Pallas[b], Simon Bianchetti[b], Adrien Le Bellec[b], Vincent Gary[a]

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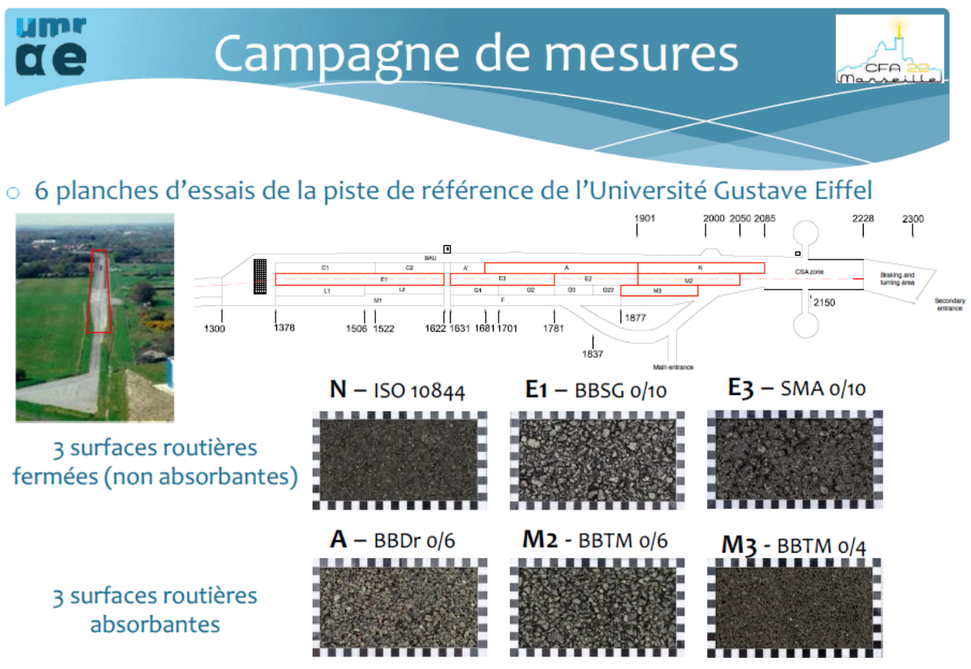
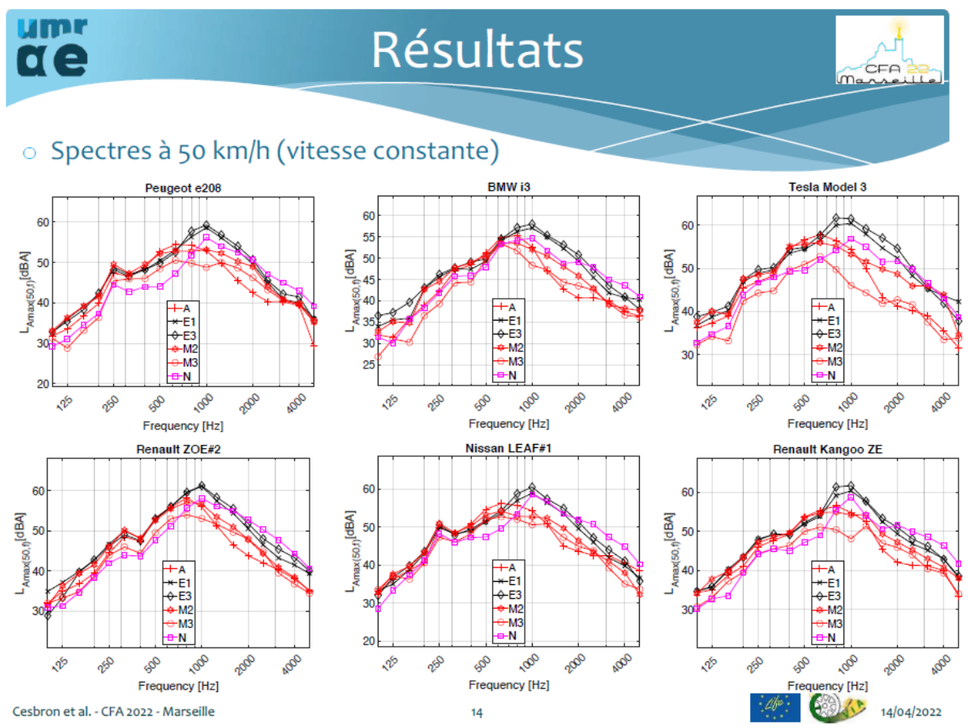
Cette étude analyse l'influence du revêtement routier sur l'émission sonore des véhicules électriques en milieu urbain. Des mesures de bruit au passage ont été réalisées en conditions contrôlées sur six revêtements routiers de la piste de référence de l'Université Gustave Eiffel à Nantes. Dans un premier temps, l'émission sonore d'un véhicule électrique utilitaire léger a été comparée à celle d'un véhicule équivalent équipé d'un moteur à combustion interne et des mêmes pneumatiques, dont les composantes roulement et moteur ont été séparées. À vitesse constante, le bruit du véhicule électrique coïncide avec le bruit de roulement du véhicule thermique dès 40 km/h pour l'ensemble des revêtements testés, confirmant la prédominance de l'interaction pneumatique/chaussée dans l'émission de bruit des véhicules électriques. Cinq modèles de véhicules électriques légers ont ensuite été testés à vitesse constante entre 30 et 70 km/h et en conditions de pleine accélération. À vitesse constante, le type de véhicule électrique a peu d'influence sur le classement acoustique des revêtements routiers à 50 km/h. La différence de niveau de bruit entre le revêtement routier le plus silencieux et le plus bruyant dépend du modèle de véhicule électrique et varie entre 4,5 dBA et 7 dBA. Pour un revêtement donné, le classement acoustique des véhicules n'est pas corrélé avec le segment du véhicule et l'écart entre le véhicule le moins bruyant et le plus bruyant varie entre 2 dBA et 3,6 dBA. En conditions d'accélération, le classement acoustique des revêtements routiers est modifié par rapport aux conditions de vitesse constante et à 50 km/h une différence de l'ordre de 5 dBA est observée entre le revêtement routier le plus silencieux et le plus bruyant. En conclusion, avec la présence croissante des véhicules électriques, l'utilisation de revêtements routiers peu bruyants est une solution efficace pour la réduction du bruit en milieu urbain. (Projet LIFE E-VIA)

# LIFE COOL & LOW NOISE ASPHALT: meeting “COSCI & COSTA"

**Issued on: April 2022**

**By: Vie en.ro.se. Ingegneria**

**EVENTS**
Code: E_6

COOL & LOW NOISE ASPHALT PROJET LIFE

**4ème COSCI & COSTA meeting**
**- April the 7th 2022 -**

**8h30-9h / WELCOME CAFE**
*Climate Academy, 2 place baudoyer – 75004 PARIS – WEB site*

**9h – 12h30 // CONFERENCE**

- 9h Word of welcome and presentation of the environmental objectives of the Paris City Hall, Climate Plan and Sound Environment Improvement Plan *(DTEC - Mairie de Paris / 10min)*
- 9h10 Introduction: infographic of the project, awareness-raising actions, LIFE objectives and presentation of the networking work *(DTEC - Mairie de Paris / 10min)*
- 9h20 Presentation of Greg Spot and David Miranda, *StreetsLA | Department of Public Works | Bureau of Street Services (10 min)*
- 9h30 Update on the intermediate results of the 2021 project and 2022 objectives
  - CPX acoustic tests *(LEM 10-15 min)*
  - Acoustic measurements on building façade *(Bruitparif 10-15 min)*
  - Thermal measurements *(DPE et Université de Paris 10-15 min)*
  - Watering tests during heat waves *(DPE et Université de Paris 10-15 min)*
  - Mechanical performances *(Colas et Eurovia 10-15 min)*
- 11h Pause
- 11h15 Presentation Bruitparif
- 11h30 Networking projects presentation
  - Giovanni Faraone, Turin Italy, CPX tests *(10 min)*
  - Chiara Bartalucci and Raffaella Bellomini, Florence, Italy *LIFE E-VIA https://life-evia.eu/* et *LIFE-SNEAK https://www.lifesneak.eu/ (10 min)*
  - Elisa Mazo Bedia, Cantabria, Spain *https://life3e.eu/ (10 min)*
- 12h Discussion with the audience

**13h-14h30 /// LUNCH**
*Péniche Marcounet, Port des Célestins, Au pied du Pont Marie - Métro Pont Marie or Hôtel de Ville*

*(14h00-14h30) Transfer by public transport*

**15h-17h30 //// VISIT of Paris noise sensors, by BRUITPARIF labs**

NB: a ZOOM link will be communicate to participants in order to make easier to participate remotely, and video recording is planned for the communication of the project

PARIS COLAS EUROVIA BRUITPARIF


Arnaldo Melloni – Comune di Firenze
Raffaella Bellomini – Vie en.ro.se Ingegneria
Chiara Bartalucci – Vie en.ro.se Ingegneria


COOL & LOW NOISE ASPHALT PROJET LIFE

# LIFE E-VIA project

**Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction**

LIFE18 ENV/IT/000201

PARIS BRUITPARIF COLAS EUROVIA


Ce projet est financé par le fond européen Life LIFE16/ENV/FR/000384


## 5. RESULTS ACHIEVED TILL NOW

**Asphalt design**

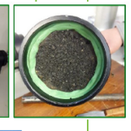
More than 150 solutions for bituminous mixtures have been analyzed. Then 9 mixtures have been selected according to acoustic response (as built and over time), expected life by referring to mechanistic properties, permeability, friction, satisfactory expected life, ENDt (Estimated Noise Difference Due to Texture) value sufficiently low. Based on additional considerations, 2 mixtures (with and without CR) have been designed for testing in Nantes.

**Test in prototypal site in Nantes**

3D surface texture, sound absorption, extended surface method, mechanical impedance, other road surface properties (SRT pendula friction tests, MPD measurements, dynamical wet friction test, Wehner and Schulze tests), CPX/CPB measurements carried out.

**Tyres design**

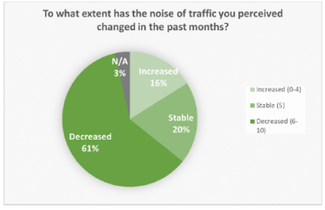
On going design of new tyres for Evs with optimized performances according to subjective noise, hydroplaning, handling, braking, wear, mechanical traction, rolling resistance. 6 versions tested in Nantes, new variant to be tested in Florence.

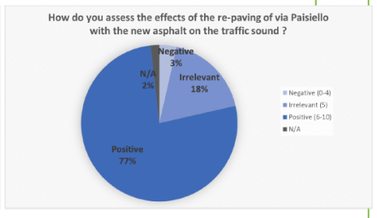



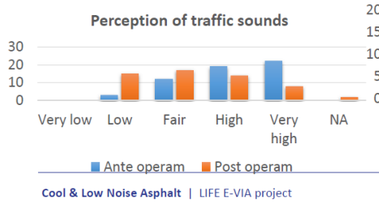


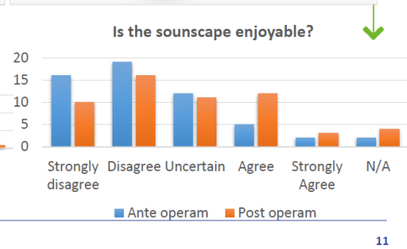
## 5. RESULTS ACHIEVED TILL NOW

**Questionnaires** (about 60 questionnaires collected in the ante and post-operam period)



# Festival Europa Agorà (Firenze)

## Issued on: May 2022

## By: Comune di Firenze

**EVENTS**

Code: E_7

### LIFE E-VIA PROJECT

**Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction**

**LIFE18 ENV/IT/000201**

### Festival d'Europa 5-12 maggio 2022

**DURATA**

Inizio: 1 luglio 2019

Fine: 31 gennaio 2023

**BUDGET**

Totale: 1.797,030 Euro

% Co-finanziamento CE: ~ 50%

**Obiettivo generale**:

Contrastare l'inquinamento acustico dovuto al rumore del traffico stradale, concentrandosi su una prospettiva futura in cui i veicoli elettrici e ibridi saranno una parte consistente del flusso di traffico.

**Obiettivi specifici**:

- Ridurre il rumore da traffico stradale all'interno di aree urbane densamente abitate attraverso l'ottimizzazione delle superfici stradali e degli pneumatici per i veicoli elettrici (EV).
- Adottare un approccio olistico basato sull'analisi del paesaggio sonoro per valutare le prestazioni di EV e veicoli tradizionali;
- Contribuire all'effettiva attuazione della legislazione UE (direttive UE 2002/49/CE e 2015/996/CE), fornendo coefficienti di rumore di rotolamento adattati agli EV.

**PRIMI RISULTATI OTTENUTI**

**Progettazione dell'asfalto**

Sono state analizzate più di 150 soluzioni di miscele bituminose. Poi 9 miscele sono state selezionate in base alla risposta acustica e alla vita attesa, facendo riferimento alle proprietà meccanicistiche, alla permeabilità, all'attrito, al valore ENDt (Estimated Noise Difference Due to Texture), etc. Sulla base di ulteriori considerazioni, 2 miscele (con e senza CR) sono state progettate per i test a Nantes.

**Test nel sito prototipale di Nantes**

Sono state effettuate prove di tessitura superficiale 3D, assorbimento acustico, superficie estesa, impedenza meccanica, e sono state analizzate altre proprietà della superficie stradale (test di attrito SRT pendula, misure MPD, test di attrito dinamico sul bagnato, test di Wehner e Schulze), oltre a misure CPX/CPB.

**Progettazione pneumatici per EVs**

È in corso la progettazione in corso di nuovi pneumatici per Evs con prestazioni ottimizzate in termini di rumore soggettivo, idroplanaggio, maneggevolezza, frenata, usura, trazione meccanica, resistenza al rotolamento. 6 versioni sono state testate a Nantes e una nuova variante sarà presto testata a Firenze.

**Realizzazione caso pilota a Firenze**

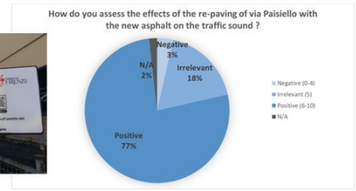
A luglio 2021 è stata realizzata la stesa del nuovo asfalto su un tratto di 150 m di via Paisiello a Firenze, in un tratto adiacente è stata effettuata la stesa di un asfalto tradizionale.

**Misure ante e post-operam**

È stata effettuata una campagna di monitoraggio del rumore e del traffico a lungo termine (2 settimane) ante e post operam. È stata verificata una significativa riduzione del rumore, specialmente secondo il parametro Lnight. Altre misure effettuate hanno riguardato: Struttura 3D e rigidità dinamica statica, Superficie estesa, Tubo d'impedenza, Martello da impatto, Indice di prossimità, Pass-by.

**Questionari**

Sono stati somministrati ai residenti di via Paisiello e analizzati circa 60 questionari in fase ante e post-operam per valutare come la variazione del paesaggio sonoro è stata percepita a livello soggettivo, ottenendo risultati più che soddisfacenti.






Associazione Italiana di Acustica
48 Convegno Nazionale
Matera, 25-27 maggio 2022

**IL PROGETTO LIFE E-VIA: RISULTATI DI UN'INDAGINE SULLA PERCEZIONE DEL SOUNDSCAPE**

Raffaella Bellomini (1), Chiara Bartalucci (1), Giulia Iannuzzi (1), Sergio Luzzi (1), Giulia Torelli (2)

1) Vie en.ro.se Ingegneria s.r.l., Firenze, raffaella.bellomini@vienrose.it
2) Dipartimento di Statistica, Informatica, Applicazioni 'Giuseppe Parenti' (DiSIA) – Università di Firenze, Firenze, giulia.torelli@unifi.it

**SOMMARIO**

Nell'ambito del progetto LIFE E-VIA è stata progettata una pavimentazione prototipale a bassa emissione di rumore, poi implementata nel caso pilota di Firenze. Il presente lavoro si occupa della valutazione dei benefici, in termini di migliore percezione del paesaggio sonoro nell'area oggetto dell'intervento e legati all'implementazione del suddetto asfalto, mediante la somministrazione di questionari ex-ante ed ex-post ai residenti e l'analisi statistica dei risultati ottenuti.

# IL PROGETTO LIFE E-VIA: RISULTATI DI UN'INDAGINE SULLA PERCEZIONE DEL SOUNDSCAPE

*Raffaella Bellomini (1), Chiara Bartalucci (1), Sergio Luzzi (1), Giulia Iannuzzi (1), Giulia Torelli (2)*

1) *Vie en.ro.se Ingegneria s.r.l., Firenze,* ***chiara.bartalucci@vienrose.it***
2) *Università degli Studi di Firenze, Firenze, giulia.torelli@virgilio.it*

48° Convegno Nazionale AIA
Matera, 25-27 maggio 2022

Questo progetto è stato finanziato dal Programma Life dell'Unione Europea con un accordo di sovvenzione n. LIFE18 ENV/IT/000201

## Analisi descrittive

- ✓ Prima della (ri)pavimentazione la maggioranza del campione (55%) aveva valutato la qualità del paesaggio sonoro vicino alla propria abitazione come "pessima", dopo l'intervento il 71% l'ha valuta almeno "buona".
- ✓ I soggetti che hanno valutato il paesaggio sonoro con caratteristiche positive ("piacevole", "interessante", "rilassante", "vivace") sono aumentati dopo la realizzazione dell'intervento e si è registrata una notevole diminuzione dei soggetti che valutano il paesaggio sonoro con caratteristiche negative.


| Options | Enjoyable | Chaotic | Interesting | Boring | Relaxing | Disturbing | Lively | Monotonous |
|---|---|---|---|---|---|---|---|---|
| Strongly disagree | -10,7% | 7,1% | -3,6% | 10,7% | -7,1% | 14,3% | 1,8% | -10,7% |
| Disagree | -5,4% | 7,1% | -1,8% | -5,4% | -12,5% | 5,4% | -10,7% | 5,4% |
| Uncertain | -1,8% | 3,6% | -3,6% | 1,8% | 14,3% | 8,9% | 0,0% | 12,5% |
| Agree | 12,5% | -17,9% | 8,9% | -1,8% | 5,4% | -5,4% | 10,7% | -1,8% |
| Strongly Agree | 1,8% | -1,8% | 0,0% | -8,9% | 0,0% | -23,2% | -1,8% | -5,4% |
| N/A | 3,6% | 1,8% | 0,0% | 3,6% | 0,0% | 0,0% | 0,0% | 0,0% |

*Differenza in percentuale riguardo la valutazione del paesaggio sonoro (Ante Operam vs Post Operam)*

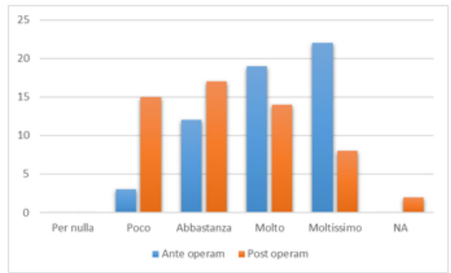


## Analisi descrittive

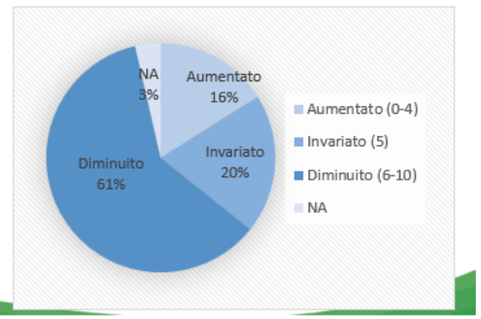
Dal confronto tra ante e post si osserva che:

- ✓ l'intensità del rumore da traffico stradale percepita dai residenti è diminuita in maniera significativa successivamente alla stesa dell'asfalto a bassa emissione di rumore
- ✓ Dopo l'intervento i residenti che hanno valutato l'intensità del rumore del traffico come "bassa" sono quintuplicati
- ✓ Il 61% del campione ha indicato di aver percepito una riduzione del rumore del traffico dopo l'intervento

*Percezione del rumore del traffico stradale (Ante e Post Operam)*




*In quale misura il rumore del traffico da lei percepito nella sua abitazione è cambiato negli ultimi mesi?*



Paper submitted to RAR 2022
"Experimental comparison of the acoustics performance of rubberised and conventional road surfaces"
Issued on: June 2022
By: Universitè Gustave Eiffel, UNIRC, IPOOL, CNR
Deadline: 31/01/2023

**SCIENTIFIC PAPERS**
Code: 36_20

# Experimental comparison of the acoustic performance of rubberized and conventional road surfaces


Lara Ginevra Del Pizzo[a], Gloria Schiaffino[b], Francesco Bianco[a], Antonino Moro[a], Stefano Carpita[a], Filippo Praticò[b], Julien Cesbron[c], Gaetano Licitra[d]

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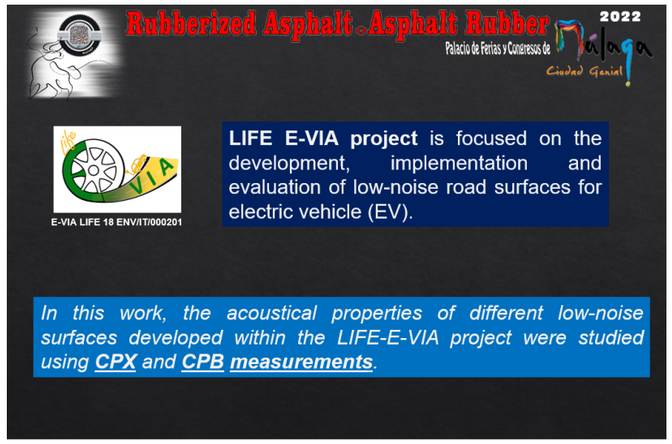
*ABSTRACT. Road Traffic Noise (RTN) remains an ongoing issue, even as the world is shifting towards the use of Electric Vehicles (EVs), since its noise source is mainly represented by the interaction between the tyre and the road surface. The use of low-noise surfaces represents one of the most viable solutions to mitigate this noise, known as Tyre/Road Noise (TRN). In this work, the acoustical properties of different low-noise surfaces developed within the LIFE-E-VIA project (LIFE18 ENV/IT/000201) were studied using CPX and CPB measurements. The pavements tested are four Very Thin Asphalt Concrete (VTAC) surfaces with Nominal Maximum Aggregate Size (NMAS) equal to 6 mm. The pavements differ only for the content of crumb rubber, which was added only in the two mixes called PCR and represents 1.9% of the weight, while the other two mixes, called P, represent a standard pavement. Experimental measurements were carried out on a test track with P and PCR in Nantes, France and, subsequently, in an urban context in Florence, Italy, where the other two P and PCR were laid. Results show that CPX noise levels are similar in both sites, while CPB levels depend on the specific characteristics of the site. The pavements designed, moreover, comply with the requirements of the European Green Public Procurement (GPP) for noise emission levels of low-noise surfaces and, moreover, the lower results obtained for the PCR in Florence compared to the P pavement confirm the possibility of crumb rubber to be used as a modifier for designing new low-noise solutions.*

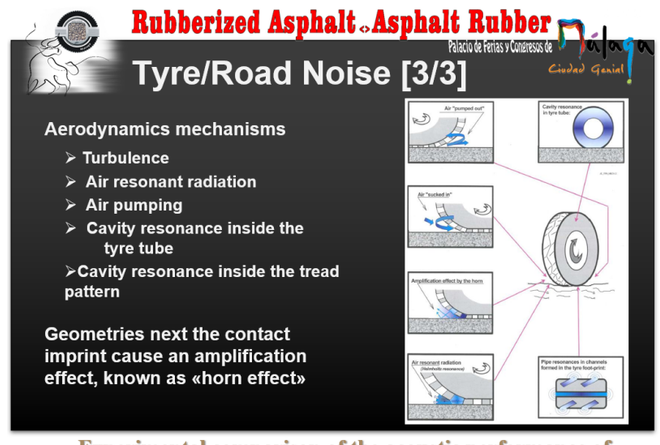


*KEYWORDS: Tyre/Road Noise, Traffic Road Noise, CPX, CPB, road texture, low-noise surfaces, rubberized surfaces, acoustical performances.*

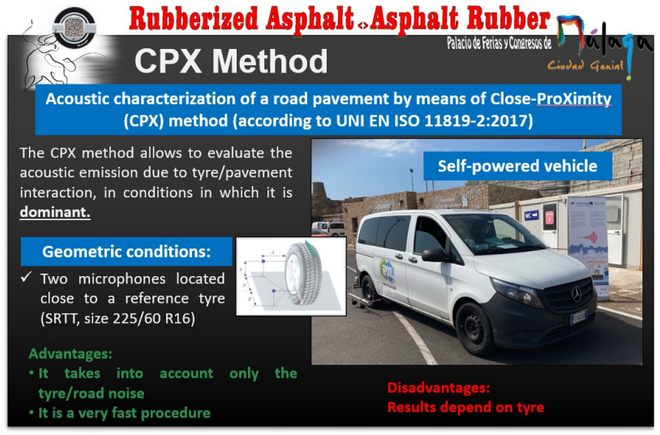


Experimental comparison of the acoustic performance of rubberized and conventional road surfaces

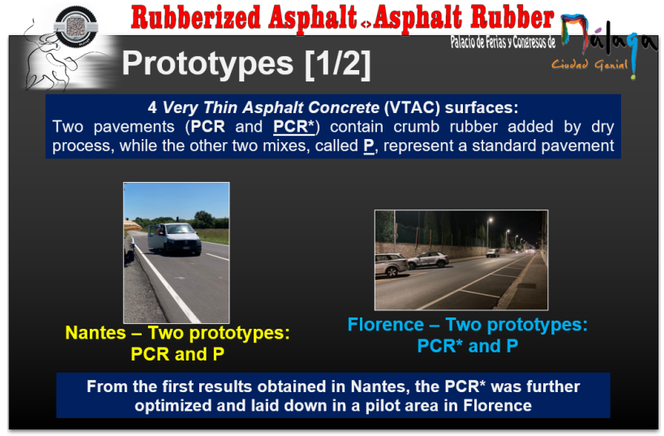


Experimental comparison of the acoustic performance of rubberized and conventional road surfaces



Experimental comparison of the acoustic performance of rubberized and conventional road surfaces



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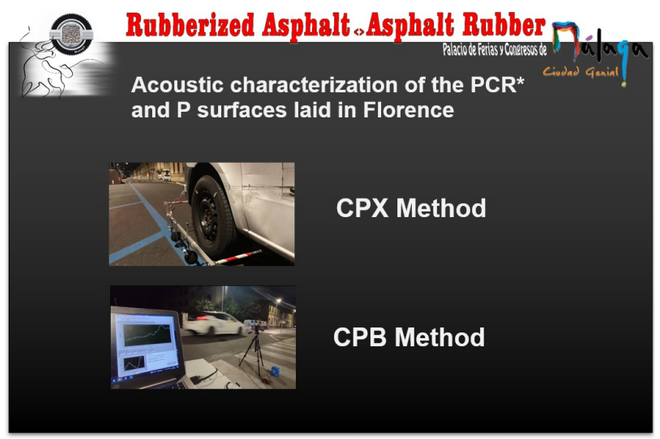
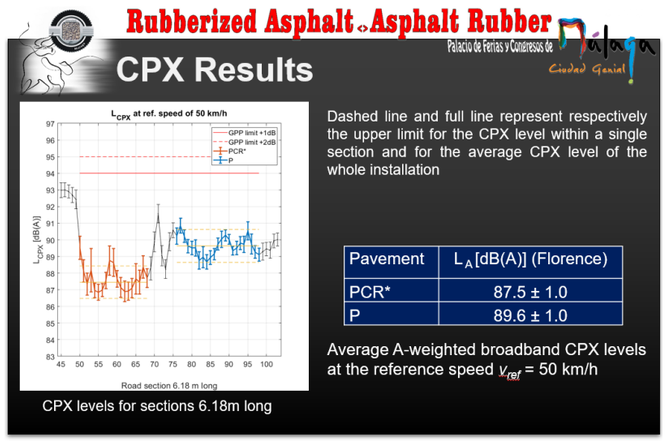




Experimental comparison of the acoustic performance of rubberized and conventional road surfaces



Experimental comparison of the acoustic performance of rubberized and conventional road surfaces

# LIFE E-VIA: Action B2 (EN)

**Issued on: June 2022**

**By: Universitè Gustave Eiffel**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_7

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimization of tyre/road interaction

LIFE18 ENV/IT/000201

Avec la contribution du programme LIFE de l'Union européenne

COMUNE DI FIRENZE · Continental The Future in Motion · Université Gustave Eiffel · iPOOL · Università degli Studi Mediterranea di Reggio Calabria · Vie en.ro.se. Ingegneria

***Context***

The European **LIFE E-VIA** project (2019-2023) combines knowledge on road surfaces and tyres to test an optimized solution reducing urban noise and life cycle costs. It addresses the perspective of an increasing traffic of electric vehicles.

Action B2 of the project aims to :

- characterize the noise emission of electric vehicles on the existing road surfaces of the Université Gustave Eiffel's reference track (Nantes, France),
- build and evaluate the prototype of an optimised road surface on the same site,
- measure and compare optimised tyre versions on the new pavement.

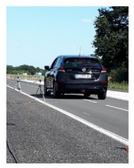
***Action B2.1***

***Analysis of the existing road surfaces:***

Measurement campaigns are carried out for the acoustic characterisation of **electric vehicles** on a selection of 6 road surfaces existing on the reference track of Université Gustave Eiffel:

- 3 dense road surfaces
- 3 absorbing road surfaces

Microphone array measurement at pass-by of a BMW i3s (left) and TESLA Model 3 (right)



Nissan Leaf

***Action B2.2***

***Construction of the prototype road surface:***

Prior to construction on a site open to traffic in Florence (Italy), a **prototype** of a low-noise road surface is implemented over a length of 57 m and a width of 8 m on the Nantes test track. It is available in 2 versions, one differentiates by the addition of crumb rubber. The formula for this asphalt was developed by **Università Mediterranea di Reggio Calabria** (Italy), a project partner.

Asphalt implementation: underlayer (left), top layer in BBTM 0/6 (right)

Prototype seen from above

***Action B2.3***

***Experimental characterisation of the prototype:***

The prototype of road surface at the Nantes site is subjected to a series of acoustic and mechanical tests, in order to assess its **performance** in terms of skid resistance and noise reduction, particularly for electric vehicles.

Microphone array measurement at pass-by of the Nissan LEAF on the prototype road

3D texture measurement

Measurement of mechanical impedance

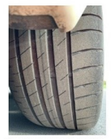
***Action B2.4***

***Evaluation of optimised tyres:***

Technical demonstrators of tyres developed by the German partner **Continental** (CRD) as part of the project are tested on the Nantes test track in order to assess various concepts on the optimised prototype of road surface.

Infrared cell for speed measurement during vehicle noise measurement at pass-by

On-board continuous noise measurement system (CPX)



Example of a specific tyre for an electric vehicle (ZOE)

Project website: https://life-evia.eu/

# LIFE E-VIA: Tyre role in the context of EV and ICEV (FR)

## Issued on: June 2022

## By: Universitè Gustave Eiffel

Deadline: 31/12/2022

**NOTICEBOARD IN FRENCH LANGUAGE**

Code: 21_5

LIFE E-VIA

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

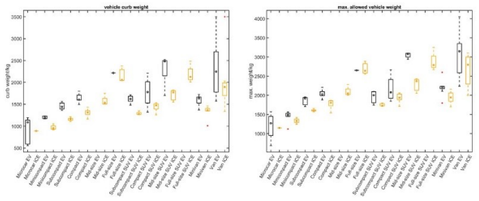
Contrôle du bruit des véhicules électriques par l'évaluation et l'optimisation de l'interaction pneumatique/chaussée

***Rôle du pneumatique dans le contexte des VE et ICE***

Les véhicules électriques (VE) diffèrent de leurs équivalents conventionnels équipés de moteur à combustion interne (ICE) par de nombreuses spécificités techniques ou de conception. Certaines d'entre elles peuvent modifier le bruit de roulement généré par l'interaction du pneumatique avec la chaussée. Ces paramètres sont par exemple une charge accrue due au poids de la batterie nécessaire pour atteindre une autonomie acceptable, un comportement particulier en accélération/décélération lié au couple produit par les moteurs électriques et à la récupération d'énergie, de nouvelles tendances pour les dimensions des pneus ("tall-and-narrow") motivées par le kilométrage, la maniabilité ou des raisons esthétiques. Une analyse du marché européen actuel et futur des VE a examiné l'éventualité de différences systématiques entre VE et ICE, susceptibles d'affecter le bruit de contact pneumatique/chaussée *via* l'un des mécanismes décrits précédemment.

***Poids du véhicule***

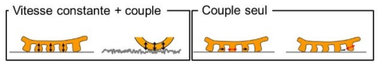
**Contexte :** Une augmentation de la charge des pneus peut conduire à une augmentation du bruit de contact pneu/chaussée. L'ampleur de cet effet dépend entre autres du pneu, de la pression de gonflage, de la vitesse et du revêtement routier. La littérature fait état d'une majoration du niveau de pression acoustique global de 0,5 à 2,5 dB par doublement de la charge. Si, de plus, l'accroissement de la charge nécessite une pression de gonflage plus élevée ou une modification de la construction du pneu, des effets négatifs additionnels sur le bruit de roulement sont probables.

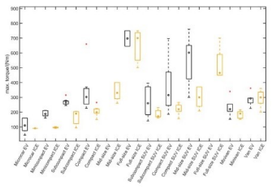



**Observations :** En moyenne, les VE sont entre 20 % et 25 % plus lourds que les ICE en poids à vide et environ 10 % à 15 % en poids maximal. Ceci a un effet défavorable sur le bruit de roulement et s'accompagne souvent d'une pression de gonflage plus élevée - pour des raisons de charge ou d'autonomie - qui augmente encore davantage le bruit de roulement.

***Couple du véhicule***

**Contexte :** Relativement à la conduite à vitesse constante, le couple des pneus dû à l'accélération ou au freinage peut augmenter le bruit de contact pneu/chaussée de plusieurs dB(A). Là encore, l'ampleur de cette augmentation dépend fortement de la conception du pneu et des conditions de fonctionnement. Cette augmentation du bruit est causée par des mécanismes d'adhésion et de frottement à micro-échelle, responsables de phénomènes tels que le stick/slip et le stick/snap. Ces derniers génèrent des vibrations tangentielles supplémentaires des pavés de la bande de roulement, d'importance mineure en cas de roulement libre.



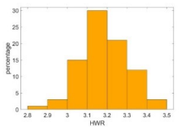

**Observations :** En raison du manque de données sur le couple des pneus de VE, et de l'influence des systèmes de contrôle électroniques et du comportement de conduite, il est difficile de tirer des conclusions définitives. Le couple moteur des VE est presque toujours plus élevé, à la fois en valeur maximale et vis-à-vis de la plage de vitesses dans laquelle il est atteint. En supposant que les systèmes de contrôle du véhicule et le comportement de conduite soient similaires à ceux des ICE, cela signifie que le couple des pneus est vraisemblablement aussi plus élevé pour les VE. Selon des observations indiquant que plus d'un tiers des utilisateurs de VE auraient une conduite plus agressive, l'hypothèse la plus pessimiste d'une augmentation du couple des pneus pour les VE semble raisonnable.

***Dimension des pneus***

**Contexte :** Le rayonnement sonore de la zone proche du contact pneu/chaussée est amplifié par la géométrie du dièdre formé par le pneu et la route. Cette amplification dépend de la fréquence, des augmentations de 5 dB à 12 dB par bande de tiers d'octave ayant été observées dans des situations de passage complexes. Elle dépend fortement de la largeur du pneu, les pneus plus étroits réduisant l'amplification. Les concepts de pneus hauts et étroits utilisés par certains VE (par exemple BMW i3) influencent significativement l'amplification par l'effet dièdre ; ils affectent à la fois la gamme de fréquences concernée et l'amplification maximale.



**Observations:** Les nouveaux concepts de taille de pneu, par ex. hauts et étroits, ne sont pas utilisés à grande échelle pour les VE. Au contraire, pour les VE dérivant d'une plateforme ICE classique, on ne constate généralement pas de modification des dimensions des pneus. Pour les nouvelles plateformes VE, seuls de légers changements sont notés, essentiellement une faible augmentation du diamètre et/ou de la largeur des pneus. Le rapport entre diamètre et largeur du pneu, fondamental dans l'amplification du rayonnement sonore, reste similaire à celui des véhicules ICE classiques.




Rapport hauteur-largeur pour les tailles typiques de pneumatiques utilisés sur les 50 modèles ICE les plus vendus sur le marché européen en 2019.




Web site: https://life-evia.eu/

# LIFE E-VIA: ACTION B2(FR)
# Issued on: June 2022
# By: Universitè Gustave Eiffel
Deadline: 31/12/2022

**NOTICEBOARD IN FRENCH LANGUAGE**
Code: 21_6

LIFE18 ENV/IT/000201
Avec la contribution du programme LIFE de l'Union européenne

## LIFE E-VIA

Contrôle du bruit des véhicules électriques par l'évaluation et l'optimisation de l'interaction pneumatique/chaussée

***Contexte***

Le projet européen **LIFE E-VIA** (2019-2023) associe les connaissances en matière de revêtement routier et de pneumatiques afin de tester une solution optimisée pour réduire le bruit en zone urbaine et le coût du cycle de vie. Il s'inscrit dans la perspective d'un trafic de véhicules électriques en augmentation.

L'action B2 du projet, pilotée par l'Université Gustave Eiffel, vise à :
• caractériser l'émission sonore des véhicules électriques sur les chaussées existantes de la piste de référence de l'Université Gustave Eiffel (Nantes, France),
• construire sur ce même site et évaluer un prototype de chaussée optimisé,
• mesurer et comparer des versions de pneumatiques optimisés sur le nouveau revêtement.

***Action B2.1***

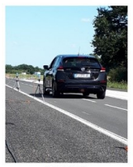
***Analyse sur des revêtements existants :***

Des campagnes de mesures sont réalisées pour la caractérisation acoustique des **véhicules électriques** sur une sélection de 6 revêtements routiers existants de la piste de référence de l'Université Gustave Eiffel :

• 3 revêtements routiers fermés
• 3 revêtements routiers poreux



Mesure par antennerie acoustique au passage sur BMW i3s (gauche) et Tesla Model 3 (droite)


Nissan LEAF

***Action B2.2***

***Construction du revêtement prototype :***

Avant construction sur site ouvert à la circulation à Florence (Italie), un **prototype** de revêtement de chaussée peu bruyant est implémenté sur une longueur de 57 m et une largeur de 8 m sur la piste de Nantes. Il est décliné en 2 versions, l'une se différenciant par l'ajout de poudrette de caoutchouc. La formule de cet enrobé a été développée par l'**Université Méditerranéenne de Reggio Calabria** (Italie), partenaire du projet.



Mise en œuvre de l'enrobé : sous-couche (à gauche), couche superficielle en BBTM 0/6 (à droite)


Prototype vu du ciel

***Action B2.3***

***Caractérisation expérimentale du prototype :***

Le prototype de chaussée du site de Nantes est soumis à un ensemble de tests acoustiques et mécaniques afin d'évaluer ses **performances** en matière d'adhérence et de réduction du bruit, notamment pour les véhicules électriques.


Mesure par antennerie acoustique au passage de la Nissan LEAF sur le prototype


Mesure de texture 3D


Mesure d'impédance mécanique

***Action B2.4***

***Évaluation de pneumatiques optimisés :***

Des démonstrateurs techniques de pneumatiques développés dans le cadre du projet par le partenaire allemand **Continental (CRD)** sont testés sur le site de Nantes afin d'évaluer différents concepts sur le prototype de revêtement optimisé.


Cellule infrarouge pour la mesure de vitesse lors des mesures de bruit au passage


Système embarqué de mesure de bruit en continu (CPX)


Exemple de pneu spécifique pour véhicule électrique (ZOE)

Site web du projet : https://life-evia.eu/

# LIFE E-VIA: Action B2 (IT)
# Issued on: June 2022
# By: Universitè Gustave Eiffel
Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**
Code: 23_5

LIFE18 ENV/IT/000201
Avec la contribution du programme LIFE de l'Union européenne

## LIFE E-VIA

Controllo del rumore dei veicoli elettrici attraverso valutazione e ottimizzazione dell'interazione pneumatico/strada

***Il contesto***

Il progetto europeo **LIFE E-VIA** (2019-2023) combina la conoscenza delle superfici stradali e degli pneumatici per testare una soluzione ottimizzata per ridurre il rumore urbano e i costi del ciclo di vita. Il progetto si fonda in un contesto di aumento del traffico di veicoli elettrici.

L'azione B2 del progetto, guidata dall'Università Gustave Eiffel, ha l'obiettivo di :
• caratterizzare l'emissione sonora dei veicoli elettrici sulle pavimentazioni esistenti della pista di prova dell'Università Gustave Eiffel (Nantes, Francia);
• costruire e valutare un prototipo di pavimentazione ottimizzata nello stesso sito;
• misurare e confrontare le versioni di pneumatici ottimizzati sulla nuova pavimentazione.

***Azione B2.1***

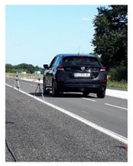
***Analisi sui pavimenti esistenti :***

Sono state effettuate campagne di misura per la caratterizzazione acustica dei **veicoli elettrici** su una selezione di 6 superfici stradali esistenti della pista di prova dell'Università Gustave Eiffel:

• 3 superfici stradali tradizionali
• 3 superfici stradali porose



Misura pass-by index su BMW i3 (a sinistra) e Tesla Model 3 (a destra)


Nissan LEAF

***Azione B2.2***

***Costruzione del prototipo di pavimentazione:***

Prima della costruzione nel caso pilota a Firenze (Italia), è stato realizzato un **prototipo** di pavimentazione a bassa rumorosità su una lunghezza di 57 m e una larghezza di 8 m sulla pista di Nantes. Il prototipo è stato realizzato in due versioni, una delle quali si differenzia per l'aggiunta di polvere di gomma. La formula di questa miscela è stata sviluppata **dall'Università Mediterranea di Reggio Calabria**, partner del progetto.



Posa del conglomerato bituminoso: sottofondo (sinistra), strato superficiale in BBTM 0/6 (destra)


Vista aerea del prototipo

***Azione B2.3***

***Caratterizzazione sperimentale del prototipo :***

Il prototipo di pavimentazione sul sito di Nantes è stato oggetto a una serie di test acustici e meccanici per valutarne le **caratteristiche** in termini di aderenza e riduzione del rumore, in particolare per i veicoli elettrici.


Misura di antenna acustica al passaggio della Nissan LEAF sopra il prototipo


Misurazione della texture 3D


Misura dell'impedenza meccanica

***Azione B2.4***

***Valutazione di pneumatici ottimizzati :***

I dati tecnici dei pneumatici sviluppati nell'ambito del progetto dal partner tedesco **Continental (CRD)** sono stati testati presso il sito di Nantes per valutare l'efficacia sul prototipo di pavimentazione ottimizzata.


Cella a infrarossi per la misurazione della velocità nelle misure di rumore pass-by


Sistema di misurazione continua del rumore a bordo (CPX)


Esempio di pneumatico specifico per veicoli elettrici (ZOE)

Sito web del progetto : https://life-evia.eu/

# Report INAD Italia 2022 (ITA)

**Issued on: July 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**REPORT ON YEARLY PARTICIPATION IN INAD**

Code: 25_2

Associazione Italiana di Acustica

**INTERNATIONAL NOISE AWARENESS DAY 2022**

***I suoni immaginati***


***Report finale***

## 1. ORGANIZZAZIONE

**Gruppo di Lavoro**

Rossella Natale (AIA – Responsabile del progetto)
Sara Delle Macchie (AIA – Coordinamento delle attività)
Sergio Luzzi (AIA - Coordinamento delle attività)
Raffaele Mariconte (AIA - Coordinamento delle attività)

Chiara Pistolesi (consulenza grafica)

Christian Tibone (Aosta)
Vittorio Valletta e Martina Casadei (Cesena)
Anna Magrini (Genova)
Luca Barbaresi (Pesaro)
Luigi Fermo (Pescara)
Gelsomina Di Feo (Sesto San Giovanni-MI)
Elisa Amato (Siracusa)

## 2. PATROCINI E COLLABORAZIONI

- EAA (European Association of Acoustic)
- INAIL (Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro)
- MiTE (Ministero della Transizione Ecologica)
- ASSOCIAZIONE NONNO ASCOLTAMI
- ARPA VALLE D'AOSTA (Agenzia regionale per la protezione ambientale della Valle d'Aosta)
- ARPAE (Agenzia regionale per la protezione ambientale dell'Emilia-Romagna)
- Università di Padova
- Università degli Studi Mediterranea di Reggio Calabria

## 3. ENTI E NETWORK INTERNAZIONALI COLLEGATI

- INAD (International Noise Awareness Day) Dept. of CENTER OF HEARING AND COMMUNICATION - USA
- WG NOISE - Working Group di EUROCITIES
- YAN Young Acoustician Network of EAA
- LIFE E-VIA project funded by EU (LIFE18 ENV/IT/000201)

## 4. MATERIALI PRODOTTI E DISTRIBUITI

È stata realizzata la nuova locandina "I suoni immaginati" con Noisella nelle vesti di scienziata.
Sono stati distribuiti in tutte scuole che hanno aderito a INAD ITALIA 2022 i seguenti materiali:

- Volume n.1 di "Le Avventure di Noisella";
- Pieghevole per Scuole Primarie "Conosci il rumore";
- Pieghevole per Scuole Secondarie "Conosci il rumore";
- Palloncini INAD Italia;
- Segnalibri INAD con "La dieta quieta".



LIFE E-VIA project (LIFE18 ENV/IT/000201): il progetto, finanziato dall'Unione Europea, si concentra sulle potenzialità di utilizzo dei veicoli elettrici ed ibridi, che in futuro avranno un ruolo importante nel mercato automobilistico. Il progetto studia l'interazione pneumatico-strada per individuare ed implementare misure di mitigazione del rumore, attraverso l'ottimizzazione sia degli pneumatici dei veicoli elettrici sia del fondo stradale. Inoltre il progetto prevede un'intensa attività di disseminazione e sensibilizzazione sul tema del rumore, organizzando anche attività negli istituti scolastici, in accordo e in collaborazione con l'attività portate avanti nelle diverse Nazioni dei partner del Progetto (Italia, Francia e Germania) nell'ambito di INAD.
In particolare, durante l'anno scolastico 2021-2022, l'Università degli Studi Mediterranea di Reggio Calabria ha coinvolto il Liceo Scientifico "Alessandro Volta" in una serie di lezioni mirate alla sensibilizzazione sul tema dell'acustica e alla preparazione di un contest per la creazione di un nuovo segnale audio per i veicoli elettrici.

- ***Liceo Scientifico "A. Volta" – Reggio Calabria (RC)***

Nell'ambito del progetto Life E-VIA "Electric Vehicle nolse control by Assesment and optimisation of tyre/road control" l'Università degli Studi Mediterranea di Reggio Calabria (partner del progetto) ha coinvolto il Liceo Scientifico "A. Volta" in una campagna di sensibilizzazione sui temi dell'acustica, con l'obiettivo di realizzare un concorso di idee per la creazione di un nuovo segnale audio per l'avvicinamento dei veicoli elettrici. Nel mese di aprile sono state organizzate le prime due giornate didattiche (11 e 12 aprile) presso l'Università, dove si è svolta anche la lezione di sensibilizzazione sul rumore in concomitanza con INAD. L'attività ha coinvolto in totale 5 classi e più di 100 studenti.
Ad ognuno degli alunni coinvolti è stato consegnato il materiale didattico predisposto dall'AIA.

# VIDEO: LIFE E-VIA PILOT CASE IMPLEMENTATION

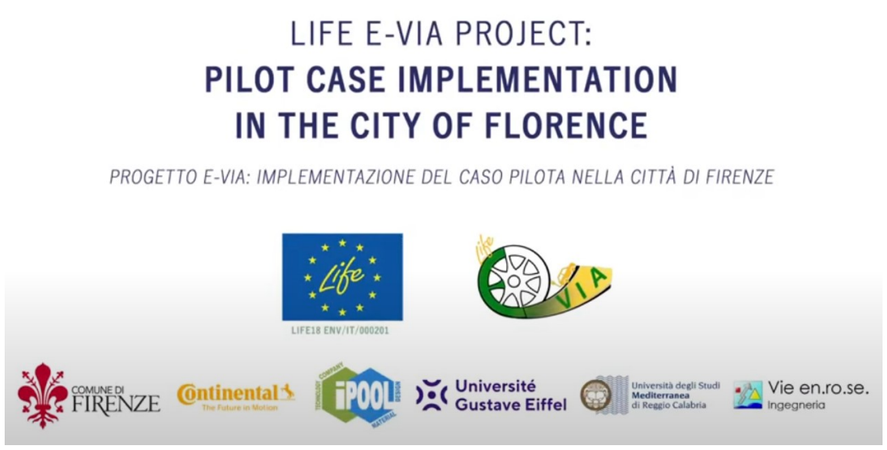
**Issued on: May 2022**

**By: Comune di Firenze**

Deadline: 31/01/2023

**PROMOTIONAL VIDEO**

Code: 26







https://youtu.be/tsfsAIk2UNs

# Low-noise friction courses containing treated and un-treated crumb rubber to mitigate tire/road noise in urban contexts

Filippo Giammaria Praticò[1] and Rosario Fedele[2]
DIIES Department, University Mediterranea of Reggio Calabria, ITALY.

**ABSTRACT**

*Tire/road interaction is one of the main causes of traffic noise. This generates health, social, and environmental issues. Bituminous mixtures containing crumb rubber, CR, and with low-nominal maximum aggregate size, NMAS, can be used to mitigate the aforementioned issues in both the short and long period. The main objective of the study presented in this paper is to investigate the variation of volumetric, surface, mechanical, and acoustical properties of friction courses due to the presence of treated and un-treated CR. Low-noise mixtures were designed during the ongoing project "E-VIA" (LIFE18 ENV/IT/000201) and were used to pave a street in Florence. In the laboratory, samples were created using the Superpave Gyratory Compactor (AASHTO T-312, UNI EN 12697-31). Specimens with NMAS=6 mm and bitumen in the range 6-7% were used as a reference. Other two sets of specimens were created adding treated and un-treated CR (dry method). Results show how the different composition affects the properties and performance of the mixtures under investigation. Future studies will include the comparison between the in-lab produced specimens (herein analyzed) and the cores extracted from the aforementioned street.*

## 3. Materials and specimens characteristics (1/1)

- Several AC6 samples were created using the Superpave Gyratory Compactor (UNI EN 12697-31)
- NMAS ranged from 6.4 mm to 7.2 mm.
- The first set of specimens are the reference ones, the other two sets were created adding treated (TCR; 2%; dry method) or un-treated (UCR; 2%; dry method) crumb rubber.
- Specimens were compacted using 130 rotations.
- The percentage of bitumen (Pb) used in all the specimens is about 6 %.

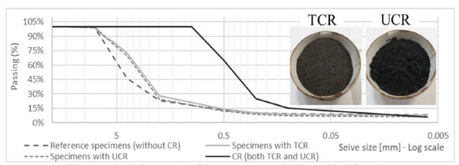


Figure 1: Gradation curves of the aggregates and CRs used in this study.


Superpave Gyratory Compactor


AC6 mix = Hot Mix Asphlt Concrete with Nominal Maximum Aggregate Size of 6 mm.

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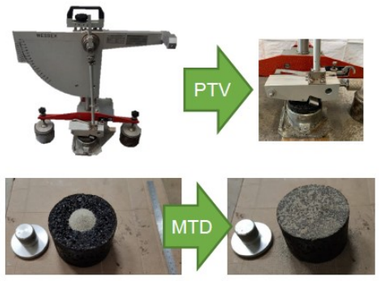
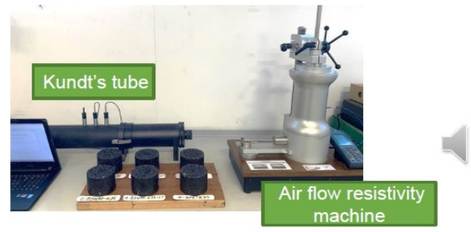
## 4. Results and discussions (2/6)

### 4.2 Effect of CR type on surface and acoustic properties

- Surface properties: Pendulum Test Value (PTV, EN 13036-4, micro-texture), and Mean Texture Depth (MTD, EN 13036-1, macro-texture).
- Acoustic properties: sound absorption coefficient ($a_0$; ISO 10534-2) averaged in the three frequency ranges (200-668 Hz, 670-1132 Hz, and 1134-1600 Hz), and air flow resistivity (r; ISO 9053-2).




9

# LIFE E-VIA: Tyre role in the context of EV and ICEV (DE)

**Issued on: August 2022**

**By: Continental**

Deadline: 31/12/2022

**NOTICEBOARD IN GERMAN LANGUAGE**

Code: 22_5

LIFE18 ENV/IT/000201

Mit Unterstützung des LIFE-Förderprogramms der Europäischen Union

## LIFE E-VIA

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimization of tyre/road interaction

***Kontext***

Das europäische **LIFE E-VIA** Projekt (2019-2023) kombiniert Fachwissen über Straßenoberflächen und Reifen um eine optimale Lösung für die Reduzierung von städtischem Lärm und von Lebenszykluskosten zu erzielen. Dabei wird die Perspektive eines zunehmenden Anteils von Elektrofahrzeugen am Verkehr berücksichtigt.

Action B2 des Projektes hat das Ziel

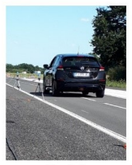
- die Geräuschemissionen von Elektrofahrzeugen auf den existierenden Fahrbahnoberflächen der Referenzteststrecke der Université Gustave Eiffel (Nantes, France) zu bestimmen,
- an selber Stelle einen Prototypen der optimierten Fahrbahnoberfläche zu bauen und diesen zu evaluieren,
- und das Rollgeräusch optimierter Reifenprototypen auf dieser neuen Fahrbahnoberfläche zu messen und zu vergleichen.

***Action B2.1*** ***Analyse existierender Fahrbahnoberflächen:***

Verschiedene Messkampagnen für die akustische Charakterisierung von **Elektrofahrzeugen** auf 6 existierenden Fahrbahnoberflächen der Referenzteststrecke der Université Gustave Eiffel werden durchgeführt:

- 3 dichte Straßenoberflächen
- 3 absorbierende Straßenoberflächen

Mikrofonarray-Messungen einer Vorbeifahrt eines BMW i3s (links) und TESLA Model 3 (rechts)



Nissan Leaf

***Action B2.2*** ***Konstruktion der Prototypenoberfläche:***

Vor dem Bau an einem für den öffentlichen Straßenverkehr zugänglichen Ort in Florenz (Italien), wird ein **Prototyp** einer geräuschoptimierten Fahrbahnoberfläche mit einer Länge von 57 m und einer Breite von 8 m auf der Teststrecke in Nantes in 2 Versionen gebaut. Diese unterscheiden sich durch die Zugabe von Gummigranulat in einer der Varianten. Der Asphalt wurde vom Projektpartner **Università Mediterranea di Reggio Calabria** (Italien) entwickelt.

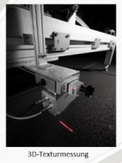
Asphaltierung: Tragschicht (links), Deckschicht in BBTM 0/6 (rechts)

Luftbild des Prototypen

***Action B2.3*** ***Experimentelle Charakterisierung des Fahrbahnprototypens:***

Der Fahrbahnoberflächenprototyp auf der Teststrecke in Nantes wird mit einer Reihe von akustischen und mechanischen Tests charakterisiert, um die **Leistungsfähigkeit** in Hinblick auf Griffigkeit und Geräuschreduzierung, im Besonderen für Elektrofahrzeuge, zu bestimmen.

Mikrofonarray-Messung einer Vorbeifahrt des Nissan LEAF auf der Prototypenfahrbahnoberfläche



3D-Texturmessung

Messung der mechanischen Impedanz

***Action B2.4*** ***Untersuchung optimierter Reifen:***

Vom Projektpartner **Continental** (Deutschland) im Rahmen des Projektes entwickelte technische Demonstratoren geräuschoptimierter Reifen werden auf der Teststrecke in Nantes getestet, um die Eignung verschiedener Konzepte auf der optimierten Fahrbahnoberfläche zu vergleichen.

Lichtschranke zur Bestimmung der Fahrzeuggeschwindigkeit während der Vorbeifahrtgeräuschmessung

On-board-System zur kontinuierlichen Geräuschmessung (CPX)

Beispiel eines speziellen Reifens für Elektrofahrzeuge (ZOE)

Webseite: https://life-evia.eu/

inter.noise 2022
21-24 AUGUST SCOTTISH EVENT CAMPUS GLASGOW

# Factors influencing tyre/road noise under torque

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France

## ABSTRACT

*High levels of road traffic noise negatively impact public health in many parts of Europe, especially in cities. The introduction of electric mobility is often seen as one of the best measures to reduce noise exposition in urban environments. Compared to internal combustion engine vehicles (ICEV), there is an increased importance of tyre/road noise for electric vehicles (EV) because of the reduced masking by the powertrain noise. This effect increases further under acceleration. Firstly, it is known that in most cases tyre/road noise is higher under torque than for free rolling. Secondly, in situations which are characterized by increased driving torque, the lack of masking from powertrain noise for EVs is especially evident when compared to ICEVs. The aim of the LIFE E-VIA project is to reduce road traffic noise in cities by providing noise optimized road surfaces and tyres for EVs. Because of the mentioned effects, not only constant speed driving needs to be considered but also accelerated driving. Consequently, within E-VIA noise measurements from an indoor drum and a test track have been used to investigate the impact of different tyre parameters and operating conditions on the change of tyre/road noise under acceleration when compared to free rolling.*

## Torque influences the ranking between different tires

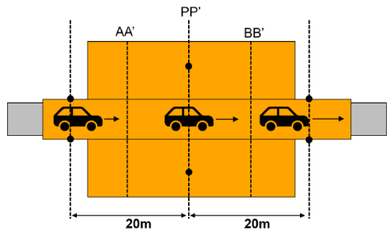
- *E-Via* reference tires and serial tires from UGE test vehicles.
- Indoor drum test without/with torque.
- Ranking and relative differences change significantly under torque.
- This needs to be considered in the rolling noise optimization within the *E-Via* project.
  → Starting point of this evaluation.

| Tire | Size | Δ to ref. in dB(A) constant 50 km/h | constant 80 km/h | SPL increase 0 Nm → 500 Nm @50 km/h |
|---|---|---|---|---|
| *E-Via* Ref. | 205/55 R16 | 0,0 | 0,0 | 0,0 |
| Fahrzeug 1 | 195/65 R15 | 1,8 | 1,6 | -1,7 |
| *E-Via* Ref. | 195/65 R15 | 1,7 | 0,2 | -0,1 |
| Fahrzeug 2 | 185/65 R15 | 2,7 | 1,4 | 0,9 |
| *E-Via* Ref | 185/65 R15 | 0,1 | -0,9 | 0,7 |

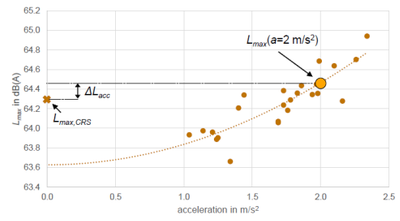


## Accelerated pass-by noise measurements

- Evaluated is the maximum sound pressure level $L_{max}$ measured between AA' and BB' for accelerated pass-bys which pass PP' with 50±1 km/h.
- Additional constant speeds pass-bys are measured following the same procedure.



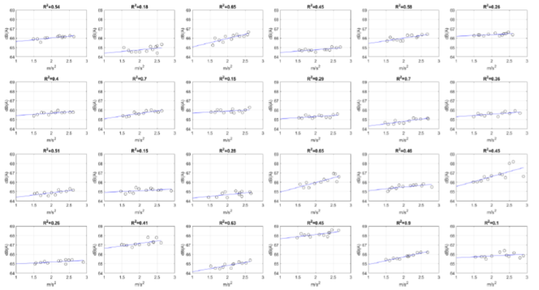

- $L_{max}$ for a reference acceleration of 2 m/s² is interpolated.
- It is still under discussion if the pass-by level for *constant rolling*, $L_{max,CRS}$, needs to be considered in this interpolation or not.
- On all slides which follow the sound pressure level change under acceleration is given as: $\Delta L_{acc} = L_{max}\left(a = 2\ \mathrm{m/s^2}\right) - L_{max,CRS}$






## Example 2: pass-by level increase under acceleration

- 24 different summer tires.
- Tested on the same test track with the same vehicle.
- Some tendencies for relation $L_{max,CRS} \leftrightarrow L_{max}$(a>0 m/s²) visible, but no consistent behavior.



# Investigation of electric vehicle noise sources on low-noise road surfaces

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**ABSTRACT**

*Electric vehicles (EVs) constitute an increasing share of the vehicle fleet, in particular regarding light vehicles. This ratio may be significantly enhanced in urban areas that favour access to low-emission vehicles. Acknowledged to be quieter than conventional vehicles due to a lower propulsion noise, EVs feature a comparatively heightened tyre-road noise contribution, further reduction of which can be achieved by selecting appropriate low-noise road surfaces. These factors may result in modified noise source distributions on the vehicles. In the framework of the LIFE E-VIA project, noise source contributions have been investigated on several light EVs from different segments on a reference ISO road surface, by using a microphone array with dedicated processing. Wide ranges of speeds and driving conditions were considered. In a second step, particular focus has been placed on the road surfaces, comparing the noise sources of selected EVs either driving on the ISO road surface or on low-noise prototypes optimized for EVs and developed within the project. These are two similar versions of a very thin asphalt concrete 0/6, one containing crumb rubber. The presentation gives an overview of the EV noise source behaviour and their ranking with regard to the various situations tested in the project.*

# Interview with Raffaella Bellomini – EXPOMOVE 2022

**Issued on: October 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/07/2022

**PRESS CONFERENCES**

Code: 11_b


https://www.youtube.com/watch?v=1I2S0t1cB_8

# Interview with Chiara Bartalucci – EXPOMOVE 2022

**Issued on: October 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/07/2022

**PRESS CONFERENCES**

Code: 11_c


https://www.youtube.com/watch?v=1I2S0t1cB_8

# Article about EV Festival on local magazine

**Issued on: October 2022**

**By: Comune di Firenze, Vie en.ro.se. Ingegneria**

Deadline: 31/07/2022

**ARTICLE FOR LOCAL MAGAZINES ABOUT EV FESTIVAL**

Code: 16

ANSA.it **Motori**

## Progetto Life E-Via, asfalto anti-rumori traffico

Ma tra le chiavi c'è pure la mobilità elettrica

**Redazione ANSA** FIRENZE 07 OTTOBRE 2022 15:45

Asfalti a bassa rumorosità e mobilità elettrica per abbattere il rumore generato dal traffico: questo è il cuore del progetto Life E-Via, illustrato oggi al salone Expomove di Firenze.

Il progetto, co-finanziato dalla Commissione Europea, coinvolge partner da tutta Europa: Comune di Firenze, Continental, Ipool, Université Gustave Eiffel, Università degli Studi Mediterranea di Reggio Calabria, Vie en.ro.se.

"Hanno espresso un interesse particolare - ha detto Arnaldo Melloni, project manager di Life E-Via per il Comune di Firenze - la Regione Toscana e anche la Regione Calabria.

https://www.ansa.it/canale_motori/notizie/componentie_tech/2022/10/07/trasporti-progetto-life-e-via-asfalto-anti-rumori-traffico_f7c6199f-68e6-4a89-bad7-1ab7a3922544.html

ero gruppo Zara, sit-in domani ad Ancona

Agenparl

Home Editoriali Internazionali Mondo Politica Economia Regioni Università Cultura Futuro Spo

Home » CS Oltre 100 mln di cittadini UE sono sottoposti a inquinamento acustico La soluzione: mobilità elettrica e asfalti a bassa rumorosità A ExpoMove 2022 il progetto LIFE E-VIA

7 Ottobre 2022 — By **Redazione**

## CS Oltre 100 mln di cittadini UE sono sottoposti a inquinamento acustico La soluzione: mobilità elettrica e asfalti a bassa rumorosità A ExpoMove 2022 il progetto LIFE E-VIA

AMBIENTE

(AGENPARL) – ven 07 ottobre 2022 COMUNICATO STAMPA

Oltre 100 mln di cittadini UE sono sottoposti a inquinamento acustico

La soluzione: mobilità elettrica e asfalti a bassa rumorosità

Oggi a ExpoMove 2022 il progetto LIFE E-VIA

Firenze, 7 ottobre 2022 – L'Agenzia europea dell'ambiente (AEA) ha lanciato un allarme: oltre 100 milioni di cittadini dell'UE sono colpiti da livelli di rumore elevati che hanno un impatto negativo sulla salute umana. Secondo l'OMS il rumore del traffico è dannoso per la salute di quasi una persona su tre.

Il 20% della popolazione europea è regolarmente esposto a livelli sonori notturni che potrebbero danneggiare in modo significativo la salute, soprattutto nelle aree urbane.

Come risolvere questo problema? Con asfalti a bassa rumorosità e mobilità elettrica:

CATEGORIE

Seleziona una categoria

IDI FARMACEUTICI


https://agenparl.eu/2022/10/07/cs-oltre-100-mln-di-cittadini-ue-sono-sottoposti-a-inquinamento-acustico-la-soluzione-mobilita-elettrica-e-asfalti-a-bassa-rumorosita-a-expomove-2022-il-progetto-life-e-via/

TECNIACÚSTICA 2 - 4 NOVIEMBRE 2022 ELCHE

# International Year of Sound 2020-2021

## Outcomes of the International Students Competition

Sergio Luzzi
Coordinator of the IYS International Students Competition Office



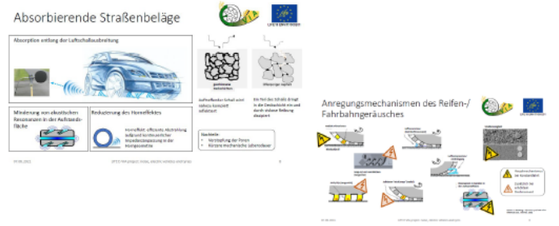
TECNIACÚSTICA 2 - 4 NOVIEMBRE 2022 ELCHE

Meetings and workshop with acoustic experts in the frame of EU-funded projects

**E**lectric **V**ehicle no**I**se control by **A**ssessment and optimisation of tyre/road interaction

*Lessons to students from Liceo A.Volta in Reggio Calabria and*
*Student contest: new audio signal for electric vehicles*

*Lesson to students from the University of Applied Sciences in Hanover*



# LIFE E-VIA: Final Event (EN)

**Issued on: November 2022**

**By: Comune di Firenze**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_9

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

***The project final event***

The final event of the LIFE E-VIA project took place the 7th October 2022 at Fortezza da Basso in Florence, in the frame of the ExpoMove event. A project stand was set up where the results were presented and disseminated through a projection of a video, posters and leaflets. Moreover, the prototype of the tyre developed by Continental in the project frame to reduce tyre rolling noise in electric vehicles was displayed in the stand.

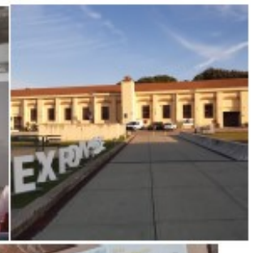
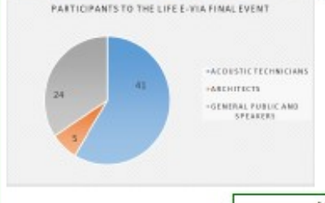
***LIFE E-VIA stand***



***The final conference***

The final conference event took place in hybrid mode (online and in-person) and in English. In the first part of the session the main results obtained by project actions were illustrated; while the afternoon session was devoted to the presentation of European projects on similar topics (LIFE NEREiDE, LIFE Cool & LoW Noise asphalts, LIFE SNEAK and Horizon NEMO) aiming to facilitate a technical comparison and an exchange of best practices. Speakers include representatives of project partners, representatives of the DG for Mobility and Transport and DG for the Environment of the European Commission and representatives of the other EU funded projects.
A total of 70 people joined the event, attended the conference and participated to discussions. Specifically, participants included: 41 Acoustics technicians, 5 Architects and 24 general public participants and speakers.




Website: https://life-evia.eu/

# LIFE E-VIA: Soundwalks organization (EN)

**Issued on: November 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_10

LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

***Introduction***

In order to assess the benefits of repaving a stretch of road with optimised asphalt in the pilot case of the LIFE E-VIA project (via Paisiello-Florence) from the point of view of subjective perception and to involve the population, soundwalks and interviews on an electric taxi were organised in the area. In particular, the experiences included (i) soundwalks with 5 listening points, with the aim of assessing the participants' perception of environmental noise and (ii) binaural headphone listening of 4 audio recordings to assess the perceived soundscape inside a vehicle; specifically, 1) inside an ICEV (internal combustion engine vehicle) while crossing a section of road with optimised asphalt of the project, 2) inside an EV (electric vehicle) - optimised asphalt, 3) inside an EV - new but standard asphalt, 4) inside an ICEV - new but standard asphalt. In order to collect data on the perception of the soundscape, an ad hoc questionnaire was developed for the participants to fill in during the experiences.

***Soundwalk itinerary and audio recordings***


*The 5 locations selected for the Soundwalk itinerary*

*Audio recordings*

***Interviews on an electric taxi***

Moreover, interviews on an electric taxi (a Nissan Leaf rent to carry out the experience) were organized to assess participants perception of the soundscape while passing, as taxi passengers, through the following sections of the pilot roas/area: 1) section with LIFE E-VIA optimized asphalt, 2) with new but standard asphalt, 3) with worn asphalt.

*The itinerary of the trip in the electric taxi*


*Leaflet for dissemination*

Website: https://life-evia.eu/

# LIFE E-VIA: Soundwalks results (EN)

**Issued on: November 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ENGLISH LANGUAGE**

Code: 18_11

LIFE18 ENV/IT/000201

## LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

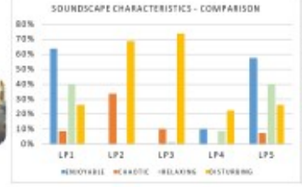
***Introduction***

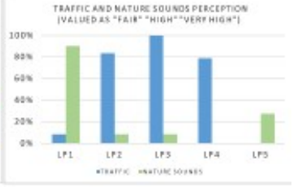
Soundwalks and interviews on an electric taxi have been carried out in the project pilot road (Paisiello street in Florence), aiming to evaluate the benefits of LIFE E-VIA optimized asphalt on soundscape perception.
From April to November 2022, 7 soundwalks were carried for a total of 80 participants who were also asked to listen to 4 audio recordings to assess the soundscape perceived inside an ICEV and an EV passing through two different road pavements: (i) LIFE E-VIA optimized asphalt, (ii) new but standard asphalt.

***Soundwalks and audio recordings results***

As regards the soundwalks, data analysis shows that LP3 is perceived as the most disturbing location; instead, LP1 and LP5 are the most enjoyable and relaxing sites in terms of soundscape. Concerning sound sources' perception in the three locations close to a street (the pilot road and a parallel one), traffic noise is perceived with a slightly less intensity in LP2 (with optimized asphalt) and LP4 than in LP3. As regards participants' assessment of audio recordings, 30% of the subjects evaluate the soundscape inside an EV passing through the optimized asphalt as "good".

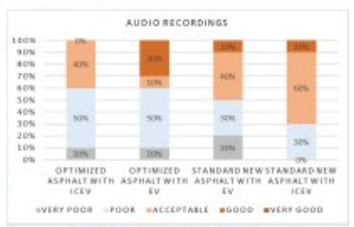
*Soundwaks' itinerary*




*Soundwaks' results*

*Participants listening of audio recordings*

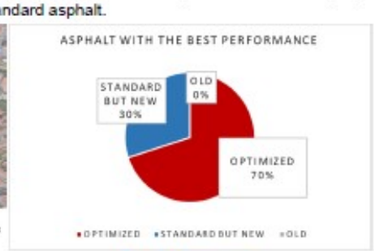



*Audio recordings' results*

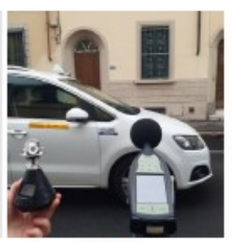
***Interviews on an electric taxi - results***

As regards the interviews conducted inside the electric taxi, 70% of the sample indicates the LIFE – EVIA optimized asphalt as the one with the best performance in terms of the perceived soundscape quality inside the EV, compared to the old asphalt and the new but standard asphalt.


*Electric taxi's route*




*Results of inteviews*



*The taxi*

Website: https://life-evia.eu/



LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

# LIFE E-VIA: Final Event (IT)

**Issued on: November 2022**

**By: Comune di Firenze**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_6

LIFE E-VIA

Electric Vehicle noIse control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

***L'evento finale del progetto***

L'evento finale del progetto LIFE E-VIA si è svolto il 7 ottobre 2022 alla Fortezza da Basso di Firenze, nell'ambito della manifestazione ExpoMove. È stato allestito uno stand del progetto dove sono stati presentati e divulgati i risultati ottenuti, attraverso la proiezione di un video, poster e volantini. Inoltre, all'interno dello stand è stato esposto il prototipo dello pneumatico sviluppato, nell'ambito del progetto da Continental, per ridurre il rumore dovuto al rotolamento degli pneumatici dei veicoli elettrici.

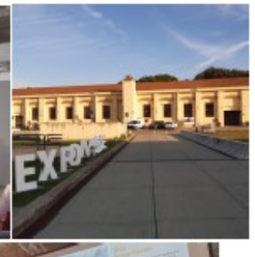
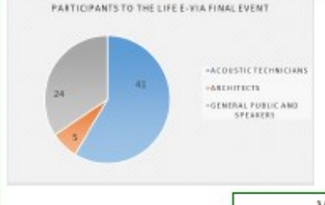
***Lo stand***



***La conferenza***

La conferenza si è svolta in modalità ibrida e in lingua inglese. Durante la sessione mattutina sono stati illustrati i principali risultati ottenuti dalle azioni di progetto; mentre la sessione pomeridiana è stata dedicata alla presentazione di progetti europei su tematiche simili (LIFE NEREiDE, LIFE Cool & LoW Noise asphalts, LIFE SNEAK e Horizon NEMO) con l'obiettivo di favorire un confronto tecnico e uno scambio di buone pratiche. Tra i relatori hanno figurato i rappresentanti dei partner del progetto, i rappresentanti della DG Mobilità e Trasporti e della DG Ambiente della Commissione Europea e i rappresentanti degli altri progetti finanziati dall'UE. Un totale di 70 persone ha partecipato all'evento, ha assistito alla conferenza e ha partecipato alle discussioni. In particolare hanno partecipato all'evento: 41 tecnici competenti in acustica, 5 architetti e 24 tra relatori e altri partecipanti.




Website: https://life-evia.eu/

# LIFE E-VIA: Soundwalks organization (IT)

**Issued on: November 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_7

LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

LIFE18 ENV/IT/000201

***Introduzione***

Al fine di valutare i benefici apportati dal rifacimento di un tratto di strada con asfalto ottimizzato nel caso pilota del progetto LIFE E-VIA (via Paisiello-Firenze) dal punto di vista della percezione soggettiva e di coinvolgere la popolazione, sono state organizzate nella zona passeggiate sonore e interviste su un taxi elettrico. In particolare, le esperienze hanno previsto: i) passeggiate sonore con 5 punti di ascolto, con lo scopo di valutare la percezione del rumore ambientale da parte dei partecipanti e ii) l'ascolto binaurale in cuffia di 4 registrazioni audio per valutare il paesaggio sonoro percepito all'interno di un veicolo; nello specifico, 1) all'interno di un ICEV (veicolo con motore a combustione interna) mentre attraversa un tratto di strada con asfalto ottimizzato del progetto, 2) all'interno di un EV (veicolo elettrico) - asfalto ottimizzato, 3) all'interno di un EV - asfalto nuovo ma standard, 4) all'interno di un ICEV - asfalto nuovo ma standard. Al fine di raccogliere dati sulla percezione del paesaggio sonoro, è stato elaborato un questionario ad hoc da far compilare ai partecipanti durante le esperienze.

***L'itinerario della passeggiata sonora e le registrazioni audio***

*I 5 punti di ascolto selezionati per le passeggiate sonore*

*Registrazioni audio*

***Le interviste sul taxi elettrico***

Inoltre, sono state organizzate interviste su un taxi elettrico (Nissan Leaf) per valutare la percezione del paesaggio sonoro da parte dei partecipanti mentre attraversano, come passeggeri del taxi, i seguenti tratti di strada: 1) tratto con asfalto ottimizzato LIFE E-VIA, 2) tratto con asfalto nuovo ma standard, 3) tratto con asfalto usurato.

*Il percorso del taxi elettrico*


*Volantino per la disseminazione*

Website: https://life-evia.eu/



LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

# LIFE E-VIA: Soundwalks results (IT)

**Issued on: November 2022**

**By: Vie en.ro.se. Ingegneria**

Deadline: 31/12/2022

**NOTICEBOARD IN ITALIAN LANGUAGE**

Code: 23_8

LIFE18 ENV/IT/000201

With the contribution of the LIFE programme of the European Union

## LIFE E-VIA

Electric Vehicle noise control by Assessment and optimisation of tyre/road interaction

***Introduzione***

Al fine di valutare i benefici, in termini di percezione del paesaggio sonoro, dell'uso dell'asfalto ottimizzato sviluppato dal progetto LIFE E-VIA, sono state realizzate delle passeggiate sonore e delle interviste all'interno di un taxi elettrico nell'area pilota di Firenze interessata dell'intervento (via Paisiello).

Da aprile a novembre 2022, si sono svolte 7 passeggiate sonore che hanno coinvolto un totale di 80 partecipanti. Inoltre, gli stessi partecipanti hanno ascoltato 4 registrazioni audio e valutato la percezione dell' ambiente sonoro all'interno di un ICEV e di un EV in transito su due diversi tratti di strada: (i) tratto con asfalto LIFE E-VIA ottimizzato, (ii) tratto con asfalto nuovo ma standard.

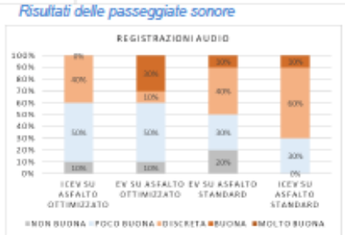
***Risultati delle passeggiate sonore e dell'ascolto delle registrazioni audio***

L'analisi delle risposte del questionario somministrato durante le passeggiate sonore mostra che il punto di ascolto LP3 è stato valutato come il più disturbante in termini di paesaggio sonoro, mentre LP1 e LP5 sono risultati quelli con ambiente sonoro più piacevole e rilassante. Per quanto riguarda la percezione delle sorgenti sonore nei tre punti di ascolto localizzati su strada (la strada pilota e una parallela), il rumore del traffico è percepito con un'intensità leggermente inferiore in LP2 (con asfalto ottimizzato) e LP4 rispetto a LP3. Con riferimento alla valutazione dei partecipanti delle registrazioni audio, il 30% dei soggetti valuta "buona" la qualità del paesaggio sonoro all'interno di un veicolo elettrico che passa su tratto di strada con asfalto ottimizzato, la percentuale soende al 10% in riferimento all'asfalto nuovo ma standard.

*L'itinerario delle passeggiate sonore*


*Risultati delle passeggiate sonore*

*Ascolto delle registrazioni audio*




*Risultati dell'ascolto delle registrazioni*

***Risultati delle interviste nel taxi elettrico***

Riguardo alle interviste condotte all'interno del taxi elettrico, il 70% del campione (80 partecipanti) indica l'asfalto ottimizzato LIFE E-VIA come quello con le migliori prestazioni in termini di qualità del paesaggio sonoro percepito all'interno dell'EV, rispetto al vecchio asfalto e all'asfalto standard nuovo.

*Il percorso del taxi elettrico*


*I risultati delle interviste*

*Il taxi elettrico*

Website: https://life-evia.eu/