E VIA – LIFE 2018 ENV/IT/00201

KICK OFF MEETING

Florence 20 september 2019

Coordinator Contacts

- *Project manager*: Arnaldo Melloni arnaldo.melloni@comune.fi.it
- *Administrative and Organizational issues*: Gessica Pecchioni gessica.pecchioni@comune.fi.it
- *Financial issues*: Paola Torrini

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- *Technical issues*: Elisabetta Sorelli e Iacopo Bianchi

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Start of the project

- We are waiting for a definitive response from the monitor. The first checks say that the start of the project is **July 1st**

General and Administrative Issues - Agenda

- Partnership agreement
- Monitor – report
- Financial report
- Kick Off meeting in Brussels
- Disseminations

Partnership Agreement

- We’re waiting for expect questions, remarks and then we’ll approve the document
- Original signature – two copies

Monitor Report

- Every **three months** the coordinator must send a general report to the monitor;
- Every **months** each partner must send a brief report (financial and technical) to the coordinator: arnaldo.melloni@comune.fi.it gessica.pecchioni@comune.fi.it

Financial Issue

- We sent to the Commission the original version of the declarations. We are waiting for the first tranche of financing (30%) and after we'll send you your part.

Financial Report

- We propose to use a model to be updated periodically and to be transmitted to the coordinator;
- In the table initially it is necessary to report the expenditure forecasts divided by type and year;
- Every **three months** it is necessary to update the table and send it to the coordinator

Financial Report

		SPESE ANNUALI (costo totale infrastruttura)					
		2019	**2020**	**2021**	**2022**	**2023**	
Personnel	**217.935,00 €**	24.387,25 €	61.404,80 €	59.174,76 €	58.631,79 €	14.336,40 €	
Travel	**14.620,00 €**	1.440,00 €	5.900,00 €	5.840,00 €	1.440,00 €		
External assistance	**52.000,00 €**	5.000,00 €	4.333,33 €	8.333,33 €	30.333,33 €	4.000,00 €	
Infrastructure	**115.000,00 €**	- €	- €	115.000,00 €	- €	- €	
Other	**5.000,00 €**	- €	- €	- €	- €	5.000,00 €	
Overheads	**22.280,00 €**	4.456,00 €	4.456,00 €	4.456,00 €	4.456,00 €	4.456,00 €	
Totale		**35.283,25 €**	**76.094,13 €**	**192.804,09 €**	**94.861,12 €**	**27.792,40 €**	426.835,00 €
Totale spese vive		**6.440,00 €**	**10.233,33 €**	**129.173,33 €**	**31.773,33 €**	**9.000,00 €**	186.620,00 €

		SPESE ANNUALI (ammortamento infrastuttura)					
		2019	**2020**	**2021**	**2022**	**2023**	
Personnel	**217.935,00 €**	24.387,25 €	61.404,80 €	59.174,76 €	58.631,79 €	14.336,40 €	
Travel	**14.620,00 €**	1.440,00 €	5.900,00 €	5.840,00 €	1.440,00 €	- €	
External assistance	**52.000,00 €**	5.000,00 €	4.333,33 €	8.333,33 €	30.333,33 €	4.000,00 €	
Infrastructure (depresation)	**28.750,00 €**	- €	- €	28.750,00 €	- €	- €	
Other	**5.000,00 €**	- €	- €	- €	- €	5.000,00 €	
Overheads	**22.280,00 €**	4.456,00 €	4.456,00 €	4.456,00 €	4.456,00 €	4.456,00 €	
Totale		**35.283,25 €**	**76.094,13 €**	**106.554,09 €**	**94.861,12 €**	**27.792,40 €**	340.585,00 €
Totale spese vive		**6.440,00 €**	**10.233,33 €**	**42.923,33 €**	**31.773,33 €**	**9.000,00 €**	100.370,00 €

Kick Off Meeting in Brussells

- 7 and 8 november 2019 in Brussels. Participation is compulsory, with up to two persons per project (projects are usually represented by their project/technical manager and financial manager);
- We must submit, by **8 October 2019,** a 5-slide presentation of our project.
- I wrote to the Commission asking for the opportunity to participate in the meeting in three representatives. We are waiting for an answer (depends on the places available)

Dissemination

- 23/24/25 october 2019 Oslo

EUROCITIES ***Environment Forum***

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LIFE E-VIA PROJECT

20 September 2019

Responsible of:

- B5 Action (Soundscape analysis)
- D1, D2 Actions (Dissemination)

Action A1 – Electric vehicles and noise emission

- Vienrose: State of the art on noise perception about Evs (related to B5 activities)

Some starting points…

- ICA CONGRESS AACHEN 2019 - Topic "Vehicle acoustics (air, road, rail, water, …)“ - 10 B - Design of warning sound - from honking impact to sound quality in electric vehicles
- https://hal.archives-ouvertes.fr/hal-01708883/file/paper_Internoise17-v4.pdf
- https://orbit.dtu.dk/files/56158267/HOW_SHOULD_AN_ELECTRIC_VEHICLE_SOUND.pdf
- https://www.semanticscholar.org/paper/Sound-Perception-Of-Electric-Vehicles-Dudenh%C3%B6ffer-Hause/9f847d2f10e8f754383d8a87c9c20d17cdfb9e72
- https://www.acoustics.asn.au/conference_proceedings/INTERNOISE2014/papers/p515.pdf

Action C1 – Monitoring of the impact of project actions Objectives

- 1) Reduction of greenhouse gas emissions (GHG) - A reduction of 29 tons/year of CO2 is estimated. This is due to the progressive transition towards electric and hybrid vehicles in the Italian context and to the use of improved tyres. (32 tons/year 3 years after project end)
- 2) Air quality and emissions - A reduction of 4000 grams/year of PM is estimated, due to the progressive transition towards Evs in the Italian context. (7300 grams/year 3 years after project end)
- 3) Waste management - It is estimated to save 2.4 tons per year of tyres due to the recycling of CR into the friction course and, consequently, to save 200 m3 of landfills per each maintainance cycle.
- 4) Reduced resource consumption (excluding energy) - It is estimated to save 0.1 tons/year of mineral aggregates due to the use of crumb rubber in friction course mixture.
- 5) Communication, dissemination, awareness rising - It is estimated that **20000 (35000 years after project end) entities/individuals will be reached/made aware of the project's outcomes**. The estimation has been based on the experience made by partners on previous LIFE projects and it is based on the several initiatives that are planned to be organized during the project (mainly the EV Festival and the participation to the International Noise Awareness Day). Data about awareness raising will be collected during Action D1 by considering the number of citizens taking part in the several foreseen initiatives.
- It is estimated to have **70000 (170000 3 years after project end) website's visits**, basing on the experience made by partners on previous LIFE projects (data about the website visits will be collected during Action D1).
- Finally, it is estimated that **2000 (5000 3 years after project end) people will change their behaviour concerning EVs** based on the hypothesis that, thanks to the activities to be carried out during D actions and to the letters of support sent to the project coordinator, there will be a changing in the citizens' behaviour in terms of sensibilization to EV and possibly purchasing of an EV in case of need to change their private or business car.

Action C1 – Monitoring of the impact of project actions Objectives

- 6) Noise performance indicators –
- - LDEN/Lnight: the estimation of noise exposure at receivers living by the roadside of the mitigation action will be evaluated within action B6. It is expected to have 5 dBA less than without mitigation at the end of the project and to have still a 3 dBA decrease compared to current values 3 years after project end.
- - LCPX: the measurements carried out within action B4 will allow the evaluation of track efficiency in terms of road/tyre noise. It is expected to have values lower than 90 dBA as required by GPP as initial value after the implementation of new surface. After 3 years a value not greater than LCPX initial value + 2 dB(A) is required by GPP. The increase of EV fleet and the peculiarity of the developed surface might lead also to better values.
- - The number of people positively affected by the reduction of noise (reduction at least 5 dB(A)) at the end of the project is estimated in at least 2000 citizens, based on the evaluation of the number of residents in a buffer of 50 m from the Michelucci street's axis.
- 7) Soundscape improvement - **The improvement of acoustic perception and comfort of a noise-optimized asphalt with respect to a standard one is estimated in a 50% (70% 3 years after project end**). Similarly, **the improvement of acoustic perception and comfort of an EV with respect to a ICEV one is estimated in a 50% (70% 3 years after project end).** These estimations will be verified according to the analysis of the questionnaires that will be collected during the three sub-actions of Action B5.
- **Number of people directly positively affected by the reduction of noise is estimated in 2000 at the end of the project and 7000 3 years after project end**
- 8) Noise-related health effects - It is estimated to have a reduction of 29% in %HSD (Self-reported sleep disturbance), a reduction of 11% in relative risk for hypertension, a reduction of 14% in relative risk of myocardial infarction and a reduction of 25% in the percentage of highly-annoyed people. These are average figures, mainly based on the following primary sources: EEA Technical report No 11/2010; WHO Environmental Noise Guidelines For The European Region, 2018.

Action C1 – Monitoring of the impact of project actions

Activity	Goals	How to do it
Communication, dissemination, awareness rising	20000 (35000 years after project end) entities/individuals will be reached/made aware of the project's outcomes.	Registered participation in congresses, workshop, dissemination activities, meetings, mailing list with confirmation of reading, etc.
	70000 (170000 3 years after project end) website's visits	Counter on website
	2000 (5000 3 years after project end) people will change their behaviour concerning EVs	- Data about purchasing of Evs in Florence - Questionnaires on availability to change behaviour about EVs
Soundscape improvement	The improvement of acoustic perception and comfort of a noise-optimized asphalt with respect to a standard one is estimated in a 50% (70% 3 years after project end). Similarly, the improvement of acoustic perception and comfort of an EV with respect to a ICEV one is estimated in a 50% (70% 3 years after project end).	Questionnaires results
	Number of people directly positively affected by the reduction of noise is estimated in 2000 at the end of the project and 7000 3 years after project end	Questionnaires results

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Action D1 – Proposals for the Project's logo overview

1

2

3

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Action D1 – Website's architecture

- **«Home page»**: project's description, news (the last three e.g), events, reserved area for partners and reserved area for external authorized users, related links to other projects or initiatives, links to social networks
- **«The project»**: description, beneficiaries, objectives, expected results, actions' description
- **«State of progress»**: Gantt chart, list of deliverables, list of milestones, progress of single actions (planned starting/ending date, actual starting/ending date, percentage of completion, …)
- **«Documents»**: publications, reports, presentations
- **«Gallery»**: photos and brief description of dissemination events
- **«News and events»**: last news in evidence and archive organized with monthly folders
- **«Main project's outcome»**: to be decided
- **«Contacts»**: references of people involved in the project for each partner (name, surname, email address, office phone number

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Action D1 – Dissemination Plan

TYPE OF ACTION	TYPE OF ACTIVITY	CODIFICATION
Dissemination products	Dissemination Plan	DP
	Life E-VIA Website	DP_W
	Noticeboard in English language	DP_NE
	Noticeboard in Italian language	DP_NI
	Noticeboard in French language	DP_NF
	Noticeboard in German language	DP_NG
	Scientific papers	DP_SP
	Articles for jurnal and magazine	DP_PA
	Report on yearly participation in INAD	DP_RI
	Layman's report	DP_RL
Promotion activity	Press conferences	PA_C
	Radio campaign	PA_RC
	Video of the prototype construction	PA_VP
	EV FESTIVAL video	PA_EV
Event	Final event	E_F
	Workshop	E_W

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Action D1 – Dissemination Plan

LIFE E-VIA (LIFE18 ENV/IT/000201)
DISSEMINATION PLAN

TYPE OF ACTION	TYPE OF ACTIVITY	CODIFICATION	2019				2020												2021												2022												2023		
			9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
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Event	Final event	E_F																																										
	Workshop	E_W																																										

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Action D1 – Dissemination Plan

Dissemination Plan Ref.n.	Deadline	Code	Issued on	Description
1	01/09/2019	DP_1		Dissemination plan
2	01/12/2019	DP_W		Life E-VIA Website
3	01/12/2022			Noticeboard in English language
		DP_NE_1		
		DP_NE_2		
		DP_NE_3		
		DP_NE_4		
		DP_NE_5		
		DP_NE_6		
		DP_NE_7		
		DP_NE_8		
		DP_NE_9		
		DP_NE_10		
		DP_NE_11		
		DP_NE_12		
		DP_NE_13		
		DP_NE_14		
		DP_NE_15		
4	01/12/2022			Noticeboard in Italian language
		DP_NI_1		
		DP_NI_2		
		DP_NI_3		
		DP_NI_4		
		DP_NI_5		
5	01/12/2022			Noticeboard in French language
		DP_NF_1		
		DP_NF_2		
		DP_NF_3		
		DP_NF_4		
		DP_NF_5		

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Action D1 – Dissemination Plan

Dissemination Plan Ref.n.	Deadline	Code	Issued on	Description
6	01/12/2022			Noticeboard in German language
		DP_NG_1		
		DP_NG_2		
		DP_NG_3		
		DP_NG_4		
		DP_NG_5		
7	01/03/2023			Scientific papers
		DP_SP_1		
		DP_SP_2		
		DP_SP_3		
		DP_SP_4		
		DP_SP_5		
		DP_SP_6		
		DP_SP_7		
		DP_SP_8		
		DP_SP_9		
		DP_SP_10		
		DP_SP_11		
		DP_SP_12		
		DP_SP_13		
		DP_SP_14		
		DP_SP_15		
		DP_SP_16		
		DP_SP_17		
8	01/12/2022			Articles for jurnal and magazine
		DP_PA_1		
		DP_PA_2		
		DP_PA_3		
		DP_PA_4		
		DP_PA_5		
		DP_PA_6		
		DP_PA_7		
9	01/12/2022			Report on yearly participation in INAD
		DP_RI_1		
		DP_RI_2		
		DP_RI_3		

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Action D1 – Dissemination Plan

Dissemination Plan Ref.n.	Deadline	Code	Issued on	Description
10	01/03/2023			Layman's report
		DP_RL		
11	01/07/2022			Press conferences
		PA_C_1		
		PA_C_2		
		PA_C_3		
12	01/12/2022			Radio campaign
		PA_RC		
13	01/12/2021			Video of the prototype construction
		PA_VP		
14	01/03/2023			EV FESTIVAL video
		PA_EV		
15	01/03/2023			Final event
		E_F		
16	01/12/2022			Workshop in Reggio Calabria
		E_W		

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Action D2 – Conferences

2020	Participants
Eurocities meetings Spring Autumn	
20 - 24 April, Lyon, France **Forum Acusticum 2020** fa2020.universite-lyon.fr	
11 - 15 May, Chicago, Illinois **179th Meeting of the Acoustical Society of America** www.acousticalsociety.org	
15 - 18 June, Karolinska Institutet, Stockholm, Sweden **13th ICBEN Congress on Noise as a Public Health Problem** www.icben2020.se	
12 - 16 July, Prague, Czech Republic **27th International Congress on Sound and Vibration (ICSV27)** iiav.org	
23 - 26 August, Seoul, Korea **49th International Congress and Exposition on Noise Control Engineering (INTER-NOISE 2020)** www.i-ince.org/	
9 - 13 November, Cancun, Mexico **180th Meeting of the Acoustical Society of America** www.acousticalsociety.org	

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Action D2 – Conferences

2021	
Eurocities meetings Spring Autumn	
26 - 28 January, Auckland, New Zealand **Noise and Vibration Emerging Methods (NOVEM 2021)** **www.novem2021.ac.nz**	
25 - 29 July, Singapore **28th International Congress on Sound and Vibration (ICSV28)** **iiav.org**	
1 - 4 August, Washington, USA **50th International Congress and Exposition on Noise Control Engineering (INTER-NOISE 2021)** **www.i-ince.org/**	
6 - 10 December, Sydney, Australia **182nd Meeting of the Acoustical Society of America joint with WESPAC 2021 and the Australian Acoustical Society** **acousticalsociety.org/asa-meetings/**	

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Action D2 – Conferences

2022	
24 - 28 October, Gyeongju, Korea **24th International Congress on Acoustics (ICA 2022)** **www.icacommission.org**	
Eurocities meetings Spring Autumn	
5 - 7 December, Santiago, Chile **Congreso Iberoamericano de Acústica (FIA 2022)** **www.socha.cl**	

E-VIA LIFE kickoff meeting 20.09.2019

Technical actions

A3 - Tyre role in the new context of EV and ICEV

(1) A market overview of representative EVs will be prepared based on publicly available data (e.g. technical data sheets, manufacturer's web sites, test/scientific reports, internal CRD tests and market screenings

(2) The data collected in (1) will be compared to the corresponding characteristics for classical ICE vehicles to identify the key tyre-related differences between these vehicle classes.

(3) Identify how the differences identified in (2) lead to a new set of target conflicts for EV tyres when compared to traditional tyres (i.e. in terms of rolling resistance or wet braking). For this existing know-how and numerical prediction methods will be used.

(4) Based on the findings of (3) and limited inhouse testing a development strategy for optimized EV tyres will be devised.

(5) This strategy will lay the foundation for CRD's contributions to actions B2, B3 and B7.

B2 - Tyre-pavement coupling study and prototype implementation

B2.1* – Acoustical characterization of EVs on existing tracks

- CRD and IFSTTAR have been in discussion regarding the measurements conducted in Sept 2019.
  - Additional data documentation.
  - Driving conditions and vehicle choice.
- The obtained exterior noise data for different tracks, vehicles and driving conditions will, together with road surface data, be used as input into actions A3, B2.4 and B7.

B2 - Tyre-pavement coupling study and prototype implementation

B2.1* – Acoustical characterization of EVs on existing tracks

- In addition, one tyre from the set used for the Kangoos will be transferred to CRD‘s testing facilities for further evaluation:
  a) drum noise measurements on
     - smooth, ISO and rough surfaces,
     - under free rolling, acceleration and braking conditions.
  b) laser surface scans of the tyre and footprint measurements as input data for an assessment of the influence of the tyre pattern on exterior noise.

B2 - Tyre-pavement coupling study and prototype implementation

B2.4 – Selection of optimized EV tyres

- CRD will deliver carved prototype tyres (incl a reference replacement summer tyre) to IFSTTAR for testing on the prototypal test surface
  - These tyres will be chosen based on the state of action B7 at the time when the surface prototype is tested.
  - The tyres will be of a size which is representative for the European EV market

- Using the mentioned tyres, IFSTTAR will perform constant speed and accelerated pass-by noise
- measurements according to UNECE R51.03 and CPX measurements on the prototypal test section and further
- standard road surfaces, using vehicles which are representative of the European ICE and EV market.

- The outcome of the noise measurement will be used as input for further investigations in action B7.

B3 - Pilot area: Implementation. Replication and transferability

B3.1 - Implementation

- Same as B2.4 but reflecting the state of action B7 at the time of the measurements in Florence.

Action B7 - Holistic performances of tyres

Background:

- For market acceptance acoustic performance cannot be seen isolated. Other performances like rolling resistance, wet braking, etc. also need to be considered.
- Moreover, these performances also cannot be seen isolated from a physical point of view, indeed there are many target conflicts where an improvement in one area will lead to a decreased performance in another area.
- Target conflicts and market requirements known for classical ICEV tyres, but not for EV tyres.

Action B7 - Holistic performances of tyres

- Starting point is the strategy for an optimized EV tyre which was designed in A3.

- In B7 the identified strategy will be used for the actual development and building of optimized EV tyres. This will involve the following steps:
  - (1) Definition of a suitable reference tyre which is typical for the European summer replacement market.
  - (2) Identification of the modifications to the reference which are needed to fulfil the development targets while at the same time maintaining other relevant performances. The approach will follow CRD's internal tyre development processes and will be supported by extensive state-of-the-art simulations to minimize development costs.
  - (3) Prototype tyres will be built. In order to reduce both building costs and time and for greater flexibility the tread pattern will not be moulded but carved.
  - (4) For the tyres build in (3) CRD will perform relevant indoor and outdoor measurements to verify the different performances.
  - (5) If necessary, steps (2) to (4) are repeated to allow for changes of the tyre based on the outcome of the measurements.
  - (6) Delivery of prototype tyres reflecting the latest state of action B7 to Nantes/Florence after construction of the respective surfaces in B2.4 and B3.1. The obtained data will be used for further development and/or validation within action B7.

LIFE E-VIA Kick-off Meeting
Florence - Italy - 20th September 2019

Technical actions carried out by IFSTTAR within LIFE E-VIA project

Julien CESBRON, Marie-Agnès PALLAS, Philippe KLEIN

IFSTTAR – Joint Research Unit in Environmental Acoustics (UMRAE)

Overview

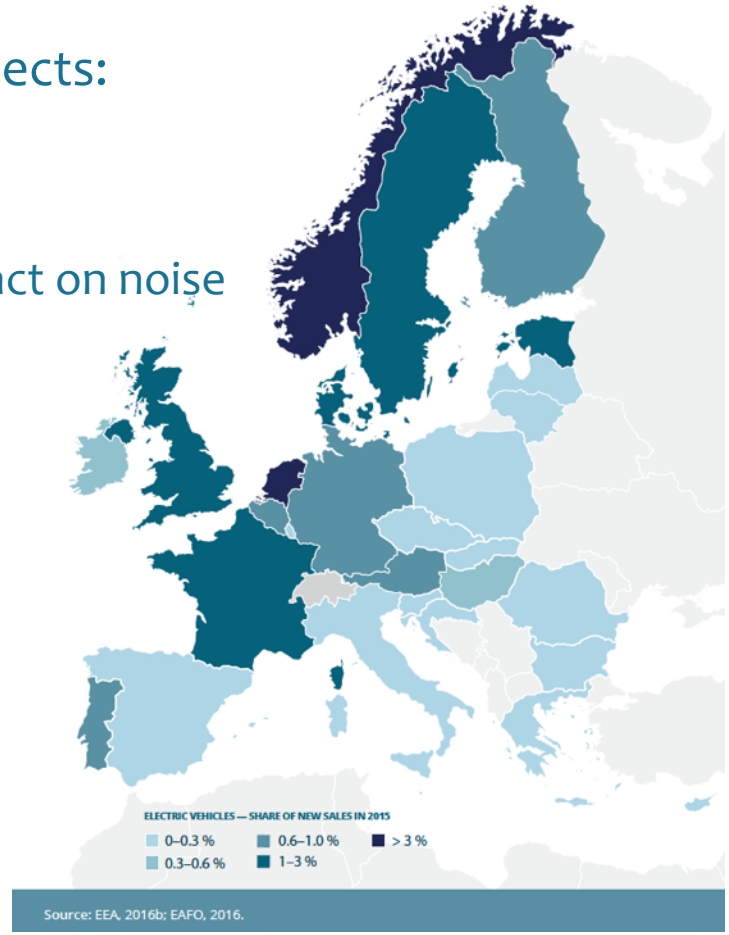
- IFSTTAR will be **leader** in actions:
  - A1: Electric vehicles and their noise emission
  - B2: Tyre-pavement coupling study and prototype implementation

- IFSTTAR will **contribute** to:
  - A2, A3: preparatory actions
  - B1, B3, B4, B6, B7, B8: implementation actions
  - C2, D1, D2, E1 : monitoring, dissemination and management

Partners	Actions															
	A1	A2	A3	B1	B2	B3	B4	B5	B6	B7	C1	C2	D1	D2	E1	E2
FI				X		X			X		X		X	X	X	
CRD			X		X	X				X			X	X	X	X
IFSTTAR	X	X	X	X	X	X	X		X	X	X		X	X	X	
IPOOL		X			X				X		X	X		X	X	
UNIRC	X	X		X	X	X					X	X	X	X	X	
VIEN	X					X		X			X		X	X	X	

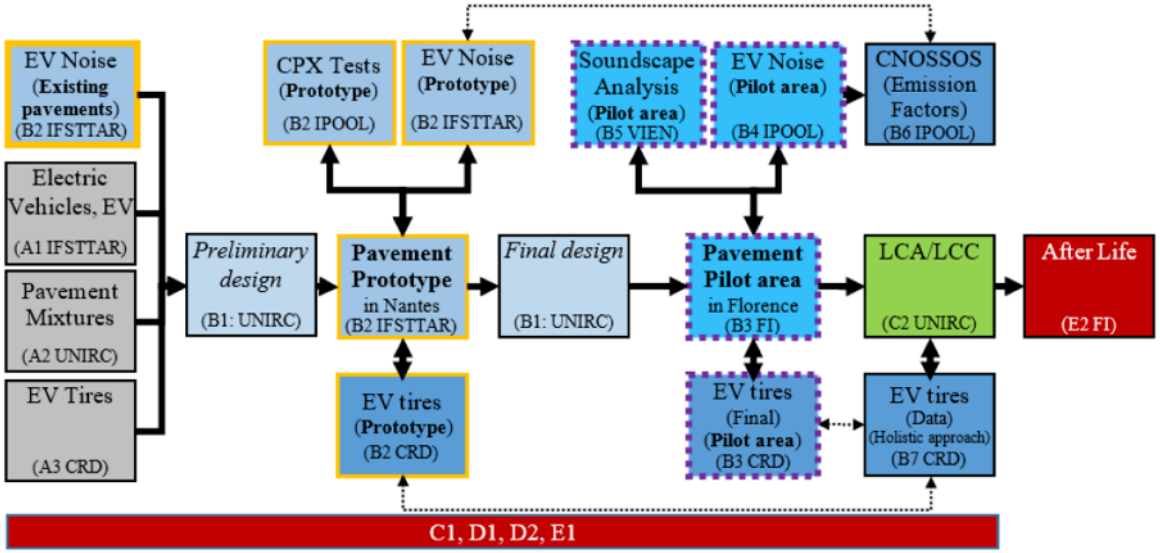
Action A1 - EVs and their noise emission

- Preparatory action (Months 1 to 7)
- Literature review considering different aspects:
  - EV fleet and distribution across Europe
    (linked with action B3)
  - Changes of driving behaviour of EV and impact on noise
    (linked with actions B1 and B2)
  - Changes in noise source emission
    (linked with action B2)
  - Changes in noise perception
    (linked with action B5)
  - EV consideration in noise prediction models
    (linked with action B6)
- Contributing partners: VIENROSE, UNIRC



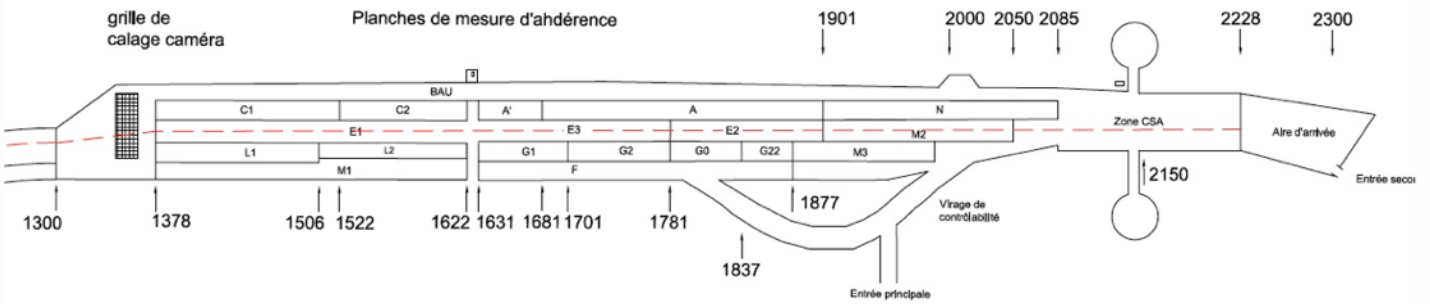
Action B2 – Tyre-pavement coupling study

- Implementation action divided in 4 sub-actions:
  - B21: Acoustical characterization of EVs on existing tracks (IFSTTAR)
    - Months 1 to 9
  - B22: Construction of a B1-based test track prototype (IFSTTAR, UNIRC)
    - Months 8 to 13
  - B23: Characterization of the B1-based prototypal test section (IFSTTAR, IPOOL)
    - Months 13 to 16
  - B24: Selection of optimized EV tyres (CRD, IFSTTAR)
    - Months 15 to 27



Action B21 - Acoustical characterization of EVs

- Measurement campaign performed on IFSTTAR reference test track



3 impervious road surfaces

N – ISO 10844

E1 – DAC 0/10

E3 – SMA 0/8

3 absorbing road surfaces

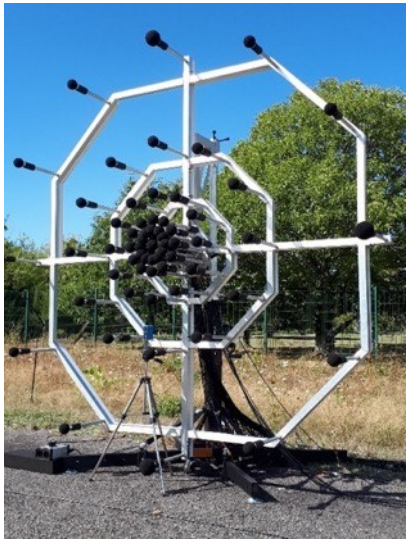
A – PA 0/6

M2 - VTAC 0/6

M3 - VTAC 0/4

Action B21 - Acoustical characterization of EVs

- Types of measurements
  - Standard Controlled Pass-By (CPB) on all road surfaces
  - Microphone array pass-by measurements (only on ISO 10844 road surface)
- Pass-by conditions :
  - Constant speed : from 20 to 110 km/h in 5 km/h steps
  - Full acceleration for start speeds from 0 to 50 km/h, in 10 km/h steps
  - Braking for start speeds from 40 km/h to 70 km/h, in 10 km/h steps

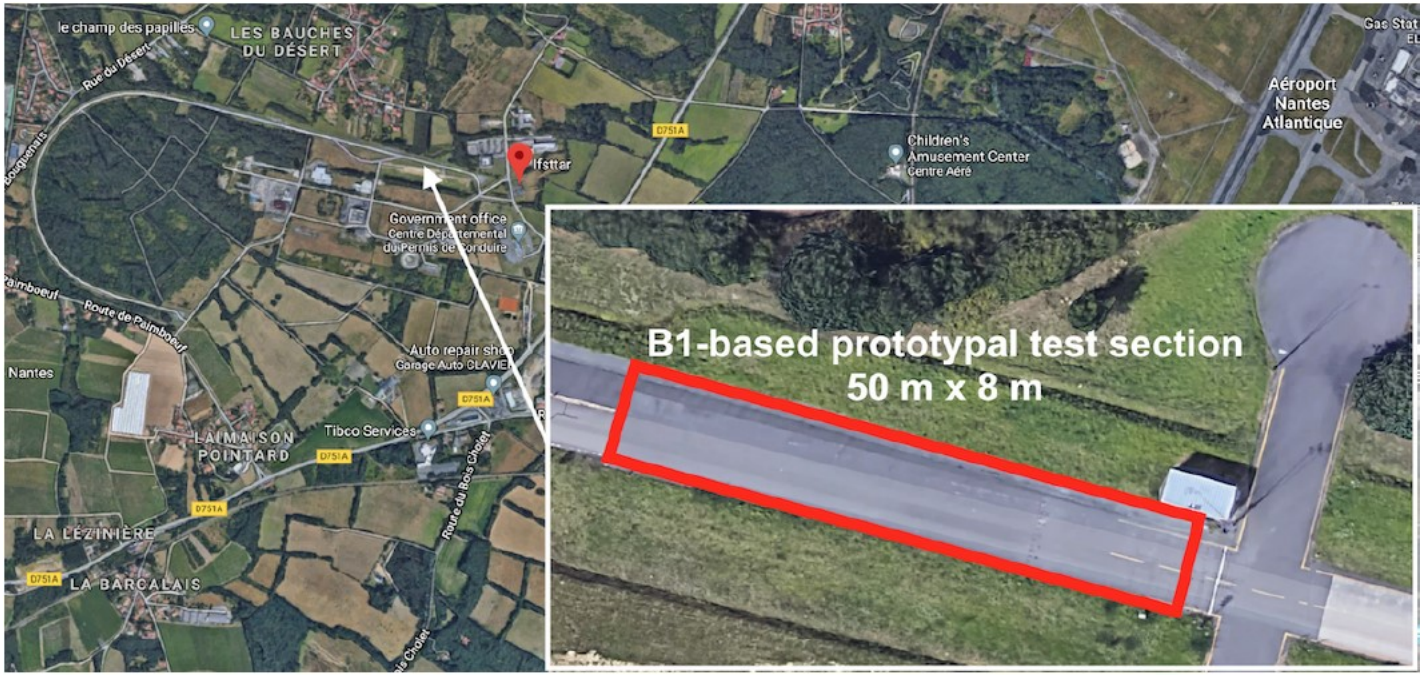


Action B21 - Acoustical characterization of EVs

- 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 during week 35:
  - 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 February 2020 based on B1 recommendations
  - Construction planned in July 2020



Action B23 – Prototype characterization

- CPB and microphone array measurements on several EVs
- CPX measurements
- Measurement of road surface properties influencing tyre/road noise
  - 3D surface texture
  - Sound absorption (impedance tube and extended surface method)
  - Mechanical impedance
- Other road surface properties:
  - SRT pendula friction tests
  - MPD measurements
  - Dynamical wet friction test
  - Wehner and Schulze tests (assessment of friction durability from surface samples)

Action B24 – Selection of optimized EV tyres

- Carved prototype tyres delivered by CRD to IFSTTAR for testing on the prototypal test surface between autumn 2020 and autumn 2021:
  - Reference tyres: standard European summer replacement market at the time of testing (e.g. Continental EcoContact 6)
  - Other tyres: variations of tread pattern, construction and/or compound of the reference
  - Aim: optimizing the balance of exterior noise performance and other tyre performances (e.g. rolling resistance, grip) for EV vehicles
- Tests to be performed by IFSTTAR:
  - Constant speed and accelerated pass-by noise measurements
  - CPX measurements on the prototypal test section and further standard road surfaces
  - Pass-by measurements will be performed using EV and ICE test vehicles representative of the respective markets

Thank you for your attention

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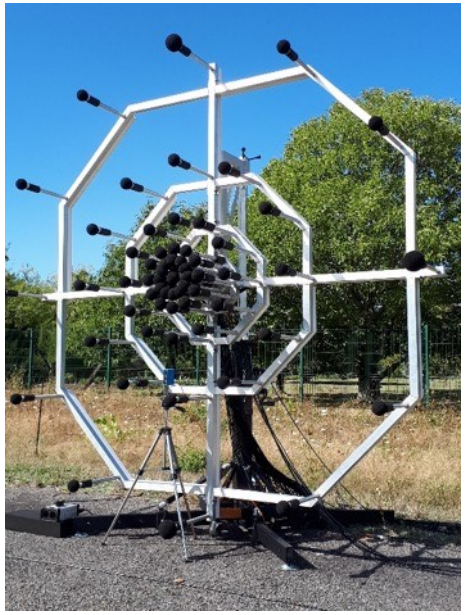
- Link:
  - http://www.umrae.fr/

Scan me

The **Joint Research Unit in Environmental Acoustics** (UMRAE) is a research laboratory common to Ifsttar and Cerema

Noise source analysis

- Microphone array
  - 61 microphones
  - Aperture 2.56 m
  - Distance typ. 3 m (laser distance meter)



- Array processing
  - Moving source beamforming
    (up to 1/3-oct 5000 Hz)
  - Array shading
  - Deconvolution

- Noise source maps
  - Localisation
  - Quantification