

6th February 2024
Online Meeting

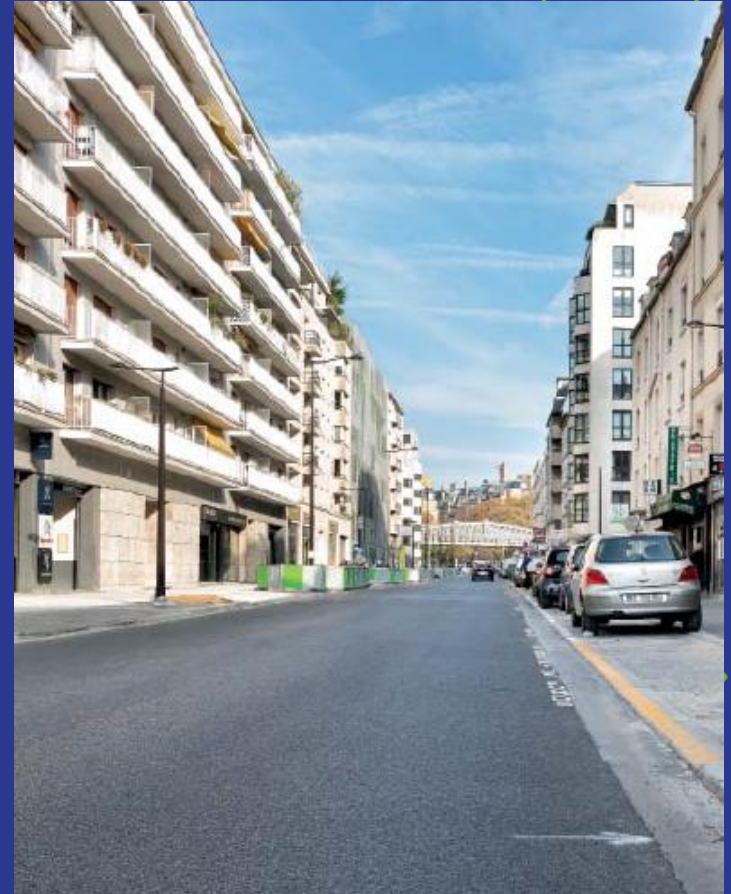
COOL
& LOW NOISE
ASPHALT PROJET
LIFE

Networking Meeting Solutions for Low Noise Road Surfaces

Paris' experience of 3 innovative asphalt formula :

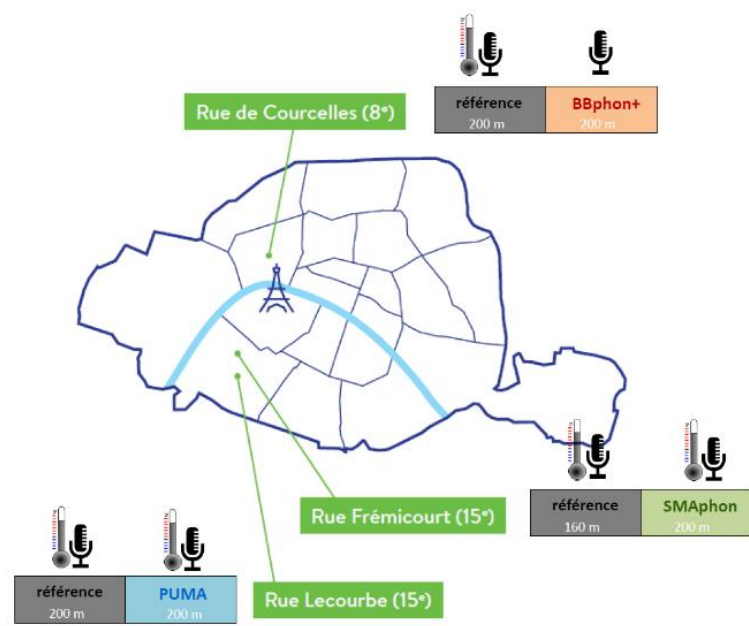
the LIFE ASPHALT project

speaker Giulia Custodi, project manager
(Environmental policy – Paris municipality)



PARIS' EXPERIENCE OF 3 INNOVATIVE ASPHALT FORMULA : THE LIFE ASPHALT PROJECT

- › Ville de Paris
- › Bruitparif
- › Mairie du 8e
- › Mairie du 15e
- › Université Paris Cité
- › Lied Pieri
- › Colas
- › Eurovia



PROJECT IDENTITY CARD

Project location :

Paris - 3 pilot sites
(rue Frémicourt, rue Lecourbe and rue de Courcelles)

Project start date :

2017

Project end date :

2023

Total budget :

2.3 M€ invested including 1.3 M€ of European funding

Financial partners :

LIFE fund LIFE16/ENV/FR/000384 and the City of Paris

Immediate beneficiaries :

1000 Parisians impacted

The project agenda



● July 2017 : project start, choice of the 3 Pilot Sites

■ 2018 : production of the 3 innovative coatings formulas

■ September - October 2018 : inauguration of the site; installation of experienced coverings on 3 Parisian sites - rue de Courcelles, rue Frémicourt and rue Lecourbe

■ 2019 - 2022 : noise measurement campaigns

■ Summers: temperature measurement campaigns

■ 2019 - 2022 : assessment and starting deployment for replicability

■ 2018 - 2028 : conferences, networking and dissemination

● October 2018 and 2019, February 2021, April 2022: COSCI & COSTA

■ Fall 2021 and 2022: « points info » on site and survey on the local residents perception

● April 7, 2023: final conference at Paris City Hall

■ June 2023 : project end

■ 2023 - 2028 : long-term monitoring and deployment ("after LIFE" approach)

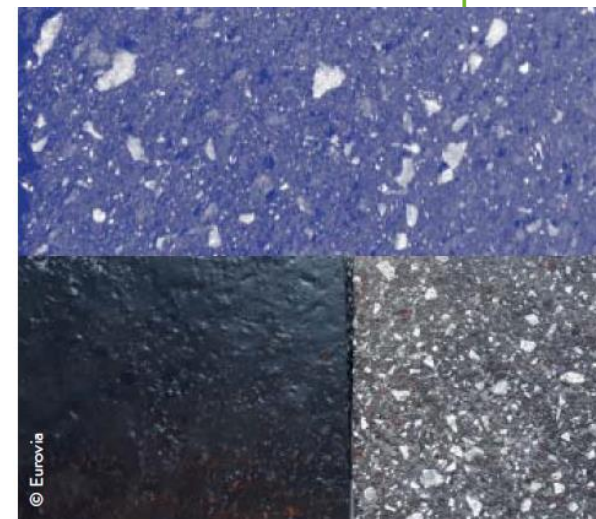
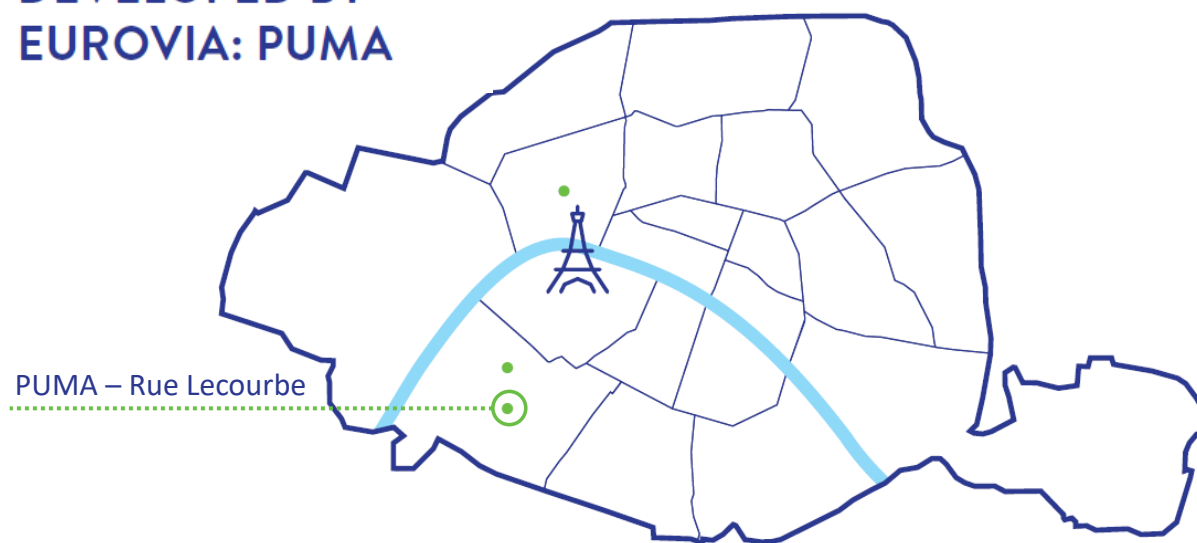
EXPERIMENTATION
AND EVALUATION

ANIMATION AND
COMMUNICATION



2018 : the formulation of innovative asphalt mixes

THE FORMULATION
DEVELOPED BY
EUROVIA: PUMA



As part of this project, EUROVIA has developed an innovative formula for hotcast asphalt road surfacing.

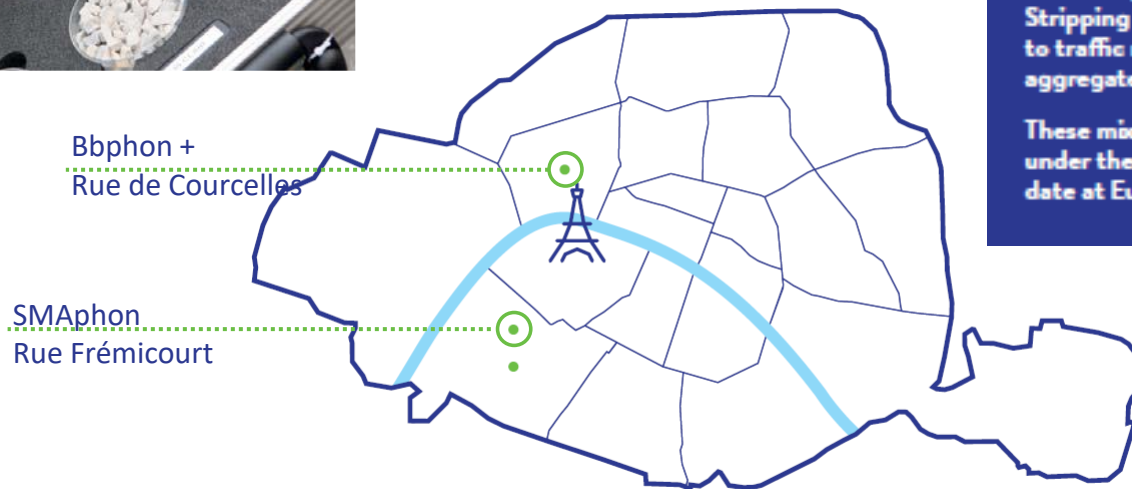
➤ The product formulation was carried out on PUMA asphalt pavement.

The mechanical study was carried out on the PUMA bonding coat/asphalt complex in order to solve the constraints of the pilot site (implementation of a thin layer of coated material then the PUMA coating without reworking the foundation).

2018 : the formulation of innovative asphalt mixes



THE 2 FORMULATIONS
DEVELOPED BY
COLAS: BBPHON+
AND SMAPHON



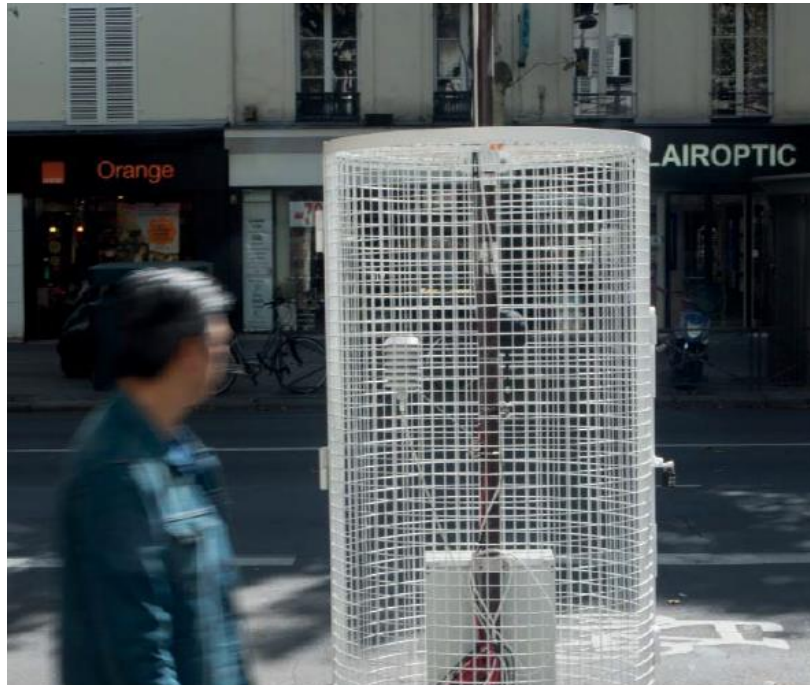
➤ **BBphon+ (BB 0/6)** with high acoustic quality. This formula was developed in order to reduce significantly the level of traffic noise.

➤ **SMaphon (BB 0/10)** allows acoustic gain in the most restrictive urban areas.

The pale aggregates used in the design of these two coverings contribute to reducing the absorption of incident solar radiation. Stripping the black bituminous binder due to traffic reveals the natural color of the aggregates.

These mix formulas have been validated under the most severe conditions used to date at European level.

PARIS' EXPERIENCE OF 3 INNOVATIVE ASPHALT FORMULA : THE LIFE ASPHALT PROJECT



Rue de Frémicourt
© COLAS - Joachim Bertrand



Diagram of the three pilot sites for testing bituminous coatings

From left to right : rue Frémicourt, rue Lecourbe and rue de Courcelles



© DTEC - Ville de Paris

Measurement methodologies

A. THERMAL MEASUREMENTS

HEAT FLOW MEASUREMENT AND TEMPERATURE, ALBEDO EFFECT OF THE COATING, WATERING



Heatwave alert level

$$T_{\text{air, max}} > 31\text{ °C}$$

$$T_{\text{air, min}} > 21\text{ °C}$$

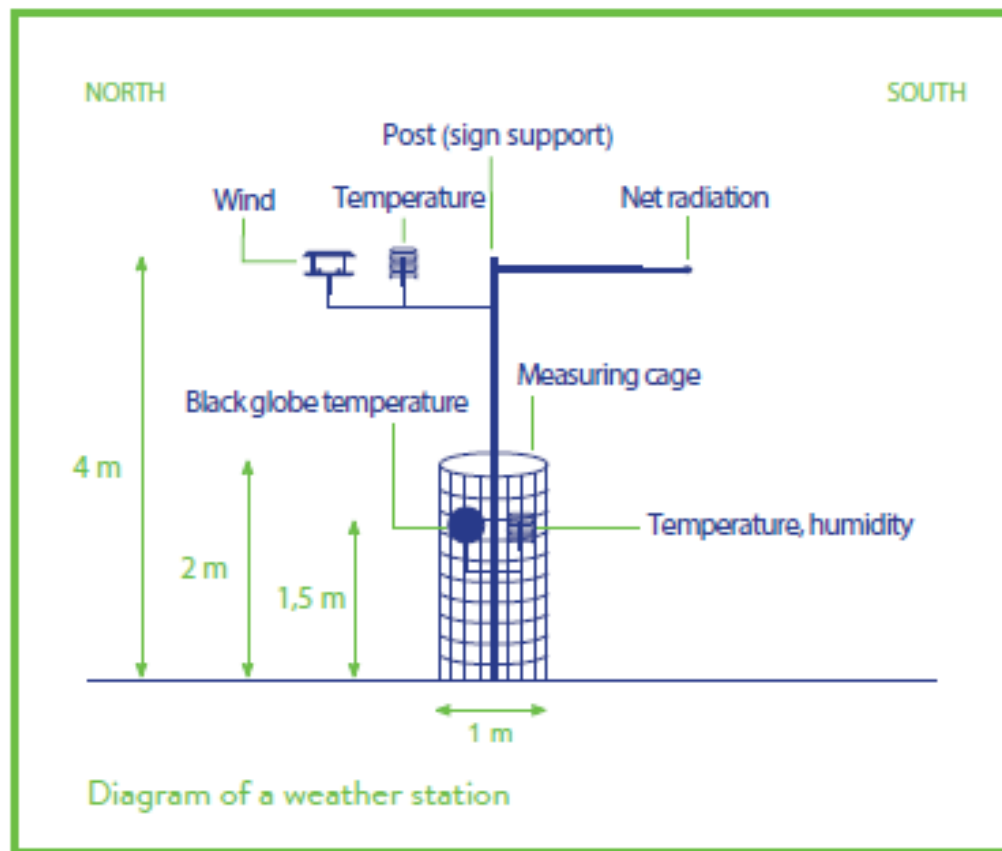
Pavement watering criteria

$$T_{\text{air, max}} > 25\text{ °C}$$

$$T_{\text{air, min}} > 16\text{ °C}$$

Wind speed < 10 km/h

Cloud cover: sunny

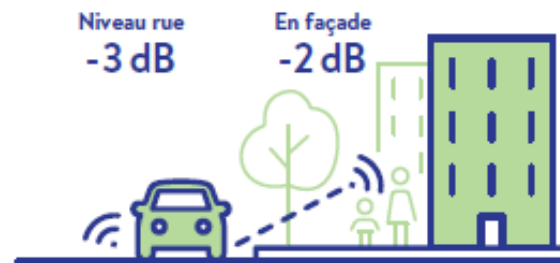


Road thermal sensors

Measurement methodologies

B. ACOUSTIC MEASUREMENTS

3 YEAR OBJECTIVE



Listening to Parisians

THREE STANDS TO COMMUNICATE THE RESULTS AND COLLECT THE FEELINGS

The LIFE ASPHALT team met on site with residents of the streets affected by the experiment, with information points organized twice on each site in 2021 and 2022.



SEPTEMBER 18, 2021: RUE FRÉMICOURT



SEPTEMBER 25, 2021: RUE LECOURBE



OCTOBER 2, 2021: RUE DE COURCELLES



SATISFACTION SURVEY*

Since changing the coating
of pavement in the last quarter of 2018

63% of respondents noted a
reduction in road noise.

BENEFITS AND PERCEPTION

- 3 décibels
is equivalent to
dividing the road traffic **by 2**

AMONG THEM

32%
consider this
reduction to be
low

44%
consider it
average

23%
consider it
important

82%
attribute this reduction
to the component
“Rolling noise”

6%
attribute it
to the component
« Engine sound »

*A satisfaction survey on the perception of road noise was implemented in situ in October 2019 among users and residents of rue Frémicourt. The questionnaire is available on the website.

THERMAL RESULTS

THERMAL MEASUREMENTS

Impact of watering in the three pilot sites in 2019, 2020 and 2021 combined
LIFE objectives: -1.5 to 2.5 Maximum effect in 2021

RUE FRÉMICOURT ⁽¹⁾				
	Impact of watering on the innovative zone			
	Air temperature at 1.5m		UTCI ⁽²⁾ at 1,5 m	
Maximal reduction	- 0,8 °C		- 2,4 °C	
Mean effect	- 0,3 °C		- 0,7 °C	
RUE LE COURBE				
	Impact of watering on the innovative zone		Impact of watering on the reference zone	
	Air temperature at 1.5m	UTCI ⁽²⁾ at 1,5 m	Air temperature at 1.5m	UTCI ⁽²⁾ at 1,5 m
Maximal reduction	- 0,8 °C	- 2,1 °C	- 0,5 °C	- 1,4 °C
Mean effect	- 0,5 °C	- 0,9 °C	- 0,3 °C	- 0,6 °C
RUE DE COURCELLES				
	Impact of watering on the innovative zone		Impact of watering on the reference zone	
	Air temperature at 1.5m	UTCI ⁽²⁾ at 1,5 m	Air temperature at 1.5m	UTCI ⁽²⁾ at 1,5 m
Maximal reduction	- 0,8 °C	- 1,9 °C	- 0,6 °C	- 2,1 °C
Mean effect	- 0,4 °C	- 0,7 °C	- 0,3 °C	- 0,7 °C

Socio-economic impacts of thermal results



Socio-economic impacts of thermal results

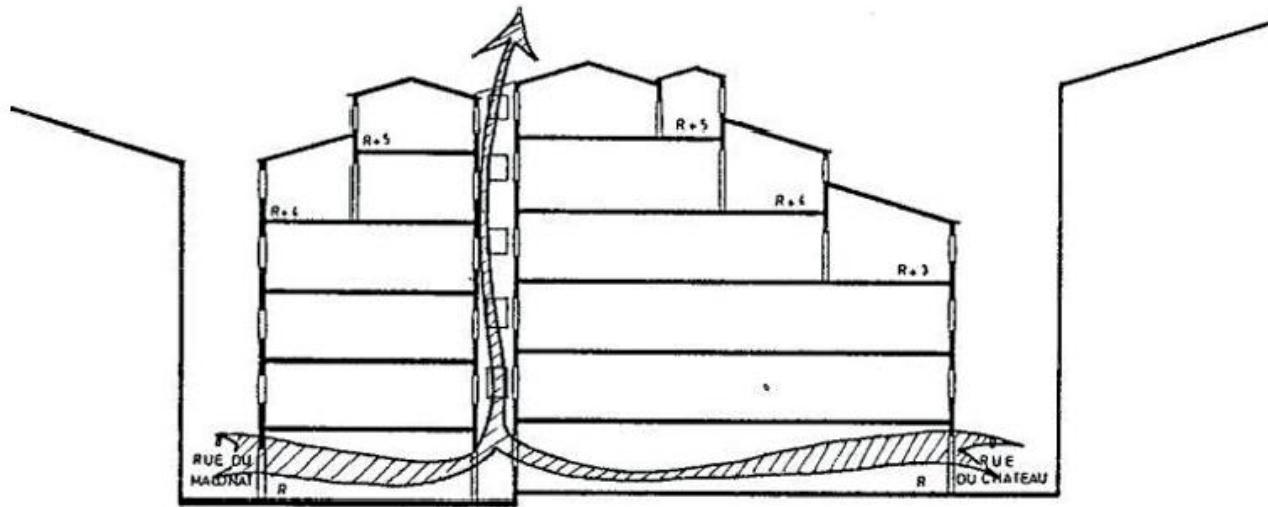


Figure : Section of the natural ventilation system powered by watering the streets and the interior courtyard of a building in Old Nice.

Source : PETITCOLLOT Christophe, « Nice : la cité sous le vent », *Science et avenir*, n°475, 1986, p. 76-79.

ACOUSTIC RESULTS

Rolling noise Δ LA10 22h-6h	COMPARED TO THE EXISTING					COMPARED TO THE REFERENCE				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
LIFE objectives	- 3	$\leq - 2$				- 2	$\leq - 1$			
Rue Frémicourt (SMaphon)	- 4,0	- 3,7	- 2,0	- 2,8	- 2,8	- 2,3	- 1,8	- 1,2	- 0,9	- 0,4
	- 4,3*	- 3,9*	- 2,9*	- 3,3*	- 3,0*					
Rue de Courcelles (BBphon+)	- 2,0	- 1,9	- 0,7	- 0,9	- 1,0	- 2,8	- 2,6	- 2,4	- 1,4	- 1,3
	- 3,5*	- 2,7*	- 2,1*	- 2,0*	- 1,8*					
Rue Lecourbe (PUMA)	0,7	- 0,1	0,6	- 0,1	- 0,4	--	--	--	2,7**	2,8**
	- 1,2*	- 1,1*	- 1,1*	- 1,4*	- 1,5*					

Table: Differences observed Δ LA10 10 p.m.-6 a.m. (all days combined); *temperature correction; ** roadway distance correction



ACOUSTIC RESULTS

CPX	COMPARED TO THE EXISTING				COMPARED TO THE REFERENCE			
Δ LAeq at 50 km/h	2019	2020	2021	2022	2019	2020	2021	2022
LIFE objectives after installation in dB(A)	-5	≤ -3			-3	≤ -2		
Rue Frémicourt (SMAphon)	-4,4	-2,3	-2,0	-1,6	-3,5	-2,2	-2,1	-2,0
Rue de Courcelles (BBphon+)	-4,7	-2,4	-1,8	-1,4	-3,3	-1,5	-1,3	-1,1
Rue Lecourbe (PUMA)	-2,1	-1,9	-1,5	-1,4	--	--	+1,6	+1,8

Table: Results of CPX measurements at 50 km/h; years 2019 to 2022.

TO NOTE

The reduction in sound levels is greatest at night when single vehicles pass, higher speeds and other sources of noise are reduced (works, human activity, etc.).



Socio-economic impacts of acoustic results

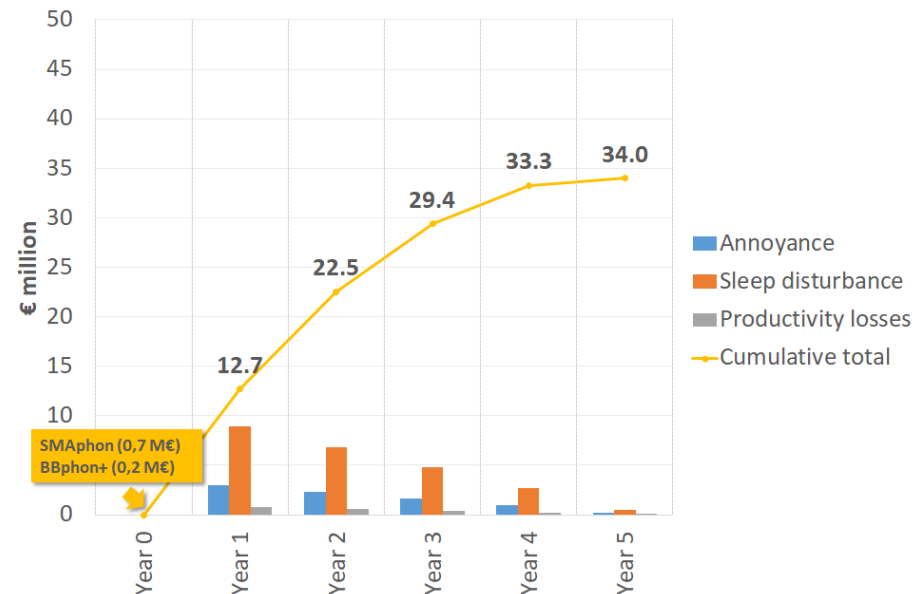
If the 50km/h Paris road network is treated, the savings made by innovative mixes (SMaphon and BBphon+) compared with standard mixes (BBM0/10) are of the order of **€34 million** after 5 years.

The extra cost would be recovered in the first year.



Savings associated with innovative asphalt mixes compared to standard asphalt mixes

50 km/h Paris road network



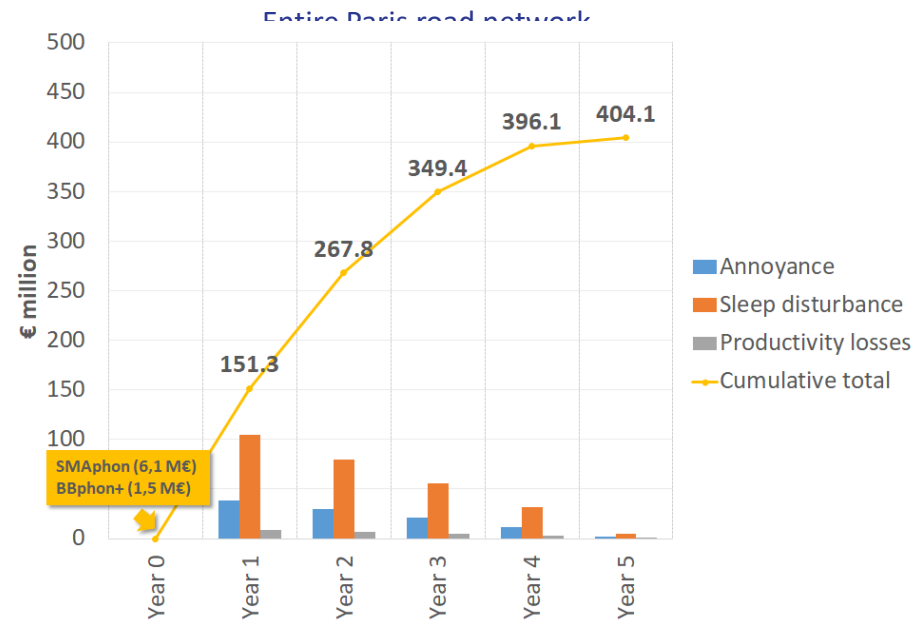
Socio-economic impacts of acoustic results



If the entire Paris road network is treated, the savings would be in the order of **€400 million** after 5 years.

The extra cost would be recovered in the first year.

Savings associated with innovative asphalt mixes compared to standard asphalt mixes



2023 - 2028 : AFTER-LIFE ACTIONS



Acoustic performance monitoring

➤ One near-field noise measurement campaign (CPX) per year.

- This will allow us to know the durability of sound-proof coatings in terms of acoustic performance.
- These data will complement those already measured on the Paris ring road.

➤ Maintaining sound measurement devices on the facade.

- Their use will make it possible to assess the impact of road development on overall noise reduction over time.
- These data will complement those already measured on the Paris ring road.
- Operational maintenance of permanent noise measurement stations.

➤ Missions carried out each year :

- Use of facade noise measurement data (LAeq1s).
- Use of meteorological data Météo France (Paris Montsouris).
- Calculation of acoustic indicators LA10 and LAeq on the facade (day/evening/night) per calendar year.
- Updating results on the LIFE project website.

➤ Missions carried out every 2.5 years :

- Use of LAeq results on the facade (day/evening/night) per year.
- Assessment of the health impact associated with the noise component (DALY discomfort and sleep disturbances) per year.
- Updating results on the LIFE project website.
- Publication and presentation of results in conferences with a European and/or international dimension.

MECHANICAL PERFORMANCE MONITORING

- A Monitoring Committee (COSUI) per site and per year.
- An average texture depth (PMT) measurement campaign per site and per year.

THE COMMUNICATION PLANNING

- COLAS and EUROVIA have written a note including all the information necessary for the production of the products (SMaphon, BBphon+ and PUMA) as a contribution to the replicability of the techniques on a European scale.
- The dissemination and publication of specifications related to the project will be done via internal channels and the website life-asphalt.eu
- The partners commit to participate in conferences, congresses and technical days around the themes of the project, and to publish scientific articles on the experimentation of the project.



COOL & LOW NOISE ASPHALT

PROJET
LIFE

Thank you for your attention!