



**BRUITPARIF**

# Road noise in the environment Measurements in real life



# BRUITPARIF: WHO WE ARE AND WHAT WE DO

- An independent non-profit organisation created in 2004 by the Regional Council
- Governance with 95 members within 4 colleges:
  - State representatives
  - Local authorities
  - Transport and economic activities
  - Associations
- 1 scientific committee
- Multiple partnerships → member of the Noise Working Group of SIA
- A multidisciplinary team of about 15 engineers and technicians

## 1. NOISE ASSESSMENT



### Data collection

An acoustic measurement network and a technical team for interventions

## 2. SUPPORTING PUBLIC POLICIES



### Processing and analysis

Staff analyze the data, produce studies and noise maps

## 3. INFORMING THE GENERAL PUBLIC



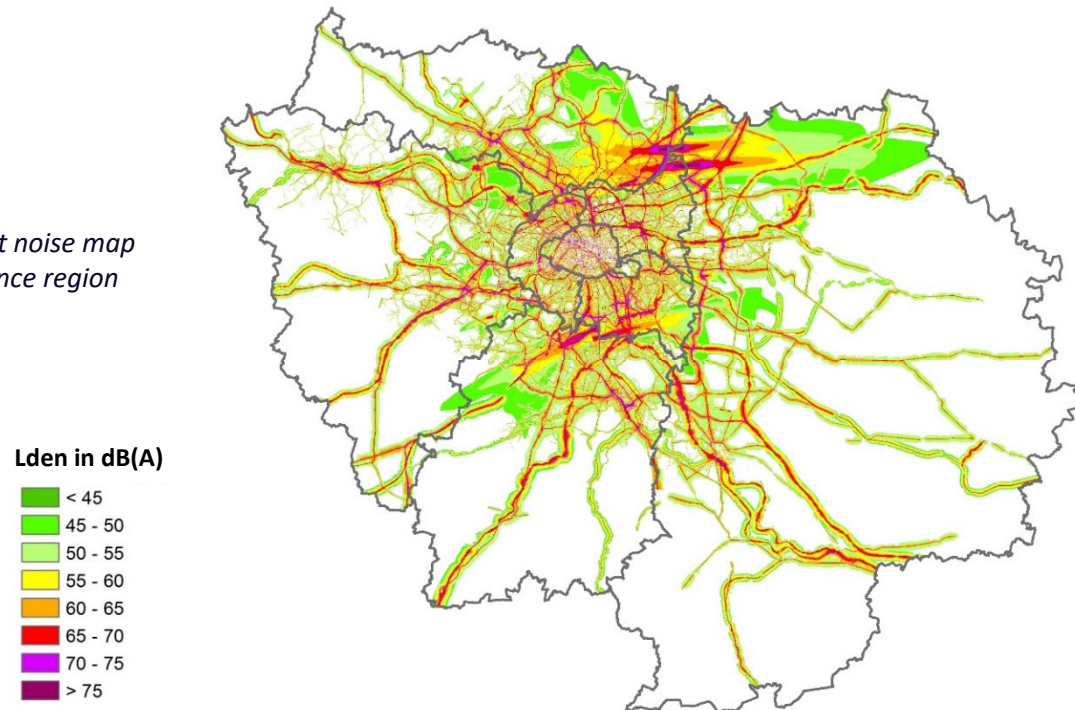
### Dissemination of information

Bruitparif raises public awareness and supports local stakeholders

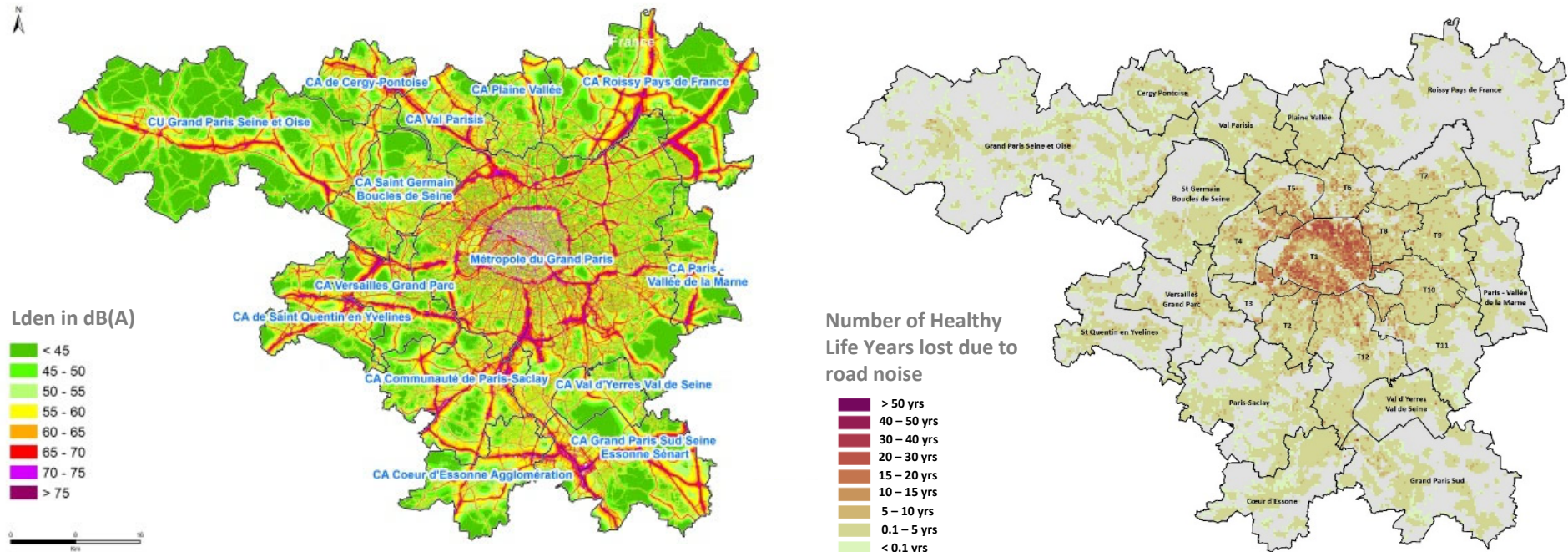
# ENVIRONMENTAL NOISE POLLUTION

- **76%** of Paris region inhabitants are **concerned** about noise
- **9 million** of Paris region inhabitants (**75%**) exposed to noise levels that exceed **WHO recommendations**
- **1,5 million** of Paris region inhabitants (**12,5%**) exposed to noise levels that exceed **French limit values**
- **108 000 DALY** (disability-adjusted life years) every year due to transport noise health impacts (annoyance, sleep disturbance, cardiovascular disease...)
- **10,7 healthy life-months lost** during a lifetime per individual in average
- Social cost of noise is estimated to be **16 billion €** per year for Paris region

*Cumulative transport noise map within the Île-de-France region*



# ROAD TRAFFIC NOISE MAP IN THE DENSE POPULATED AREA OF THE ILE-DE-FRANCE REGION ACCORDING TO END

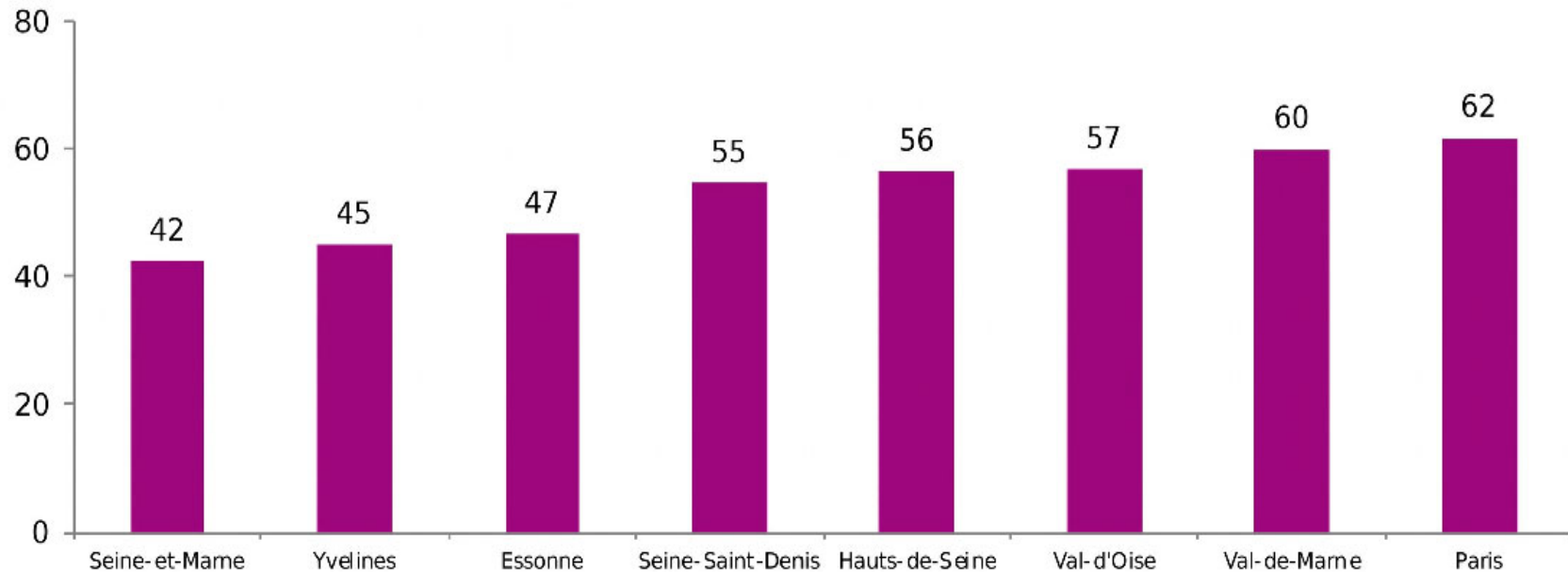


10,8% of the population > VL Lden 68 dB(A) and 3,3 % > VL Ln 62 dB(A)

85 % and 80,4 % above WHO recommendations (53 dB(A) Lden and 45 dB(A) Ln)

# 54 % OF ILE-DE-FRANCE RESIDENTS ANNOYED BY NOISE WHILE AT HOME

Annoyance increasing with the urban density : 62% in Paris center whereas 42% in rural areas (Seine et Marne department for instance)



*% of very and somewhat annoyed residents  
Source : CREDOC Study for Bruitparif, 2016*

# THE ASSESSMENT SYSTEM

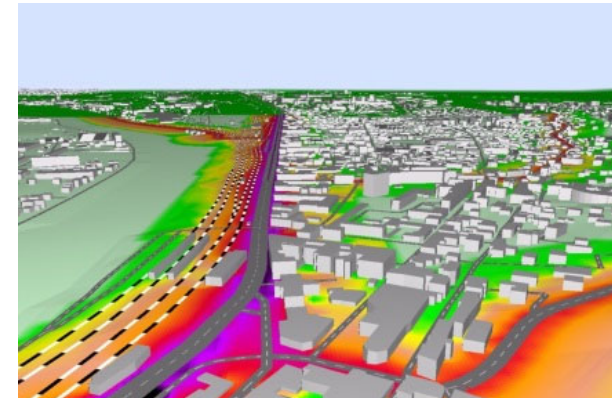
## 3 complementary tools:



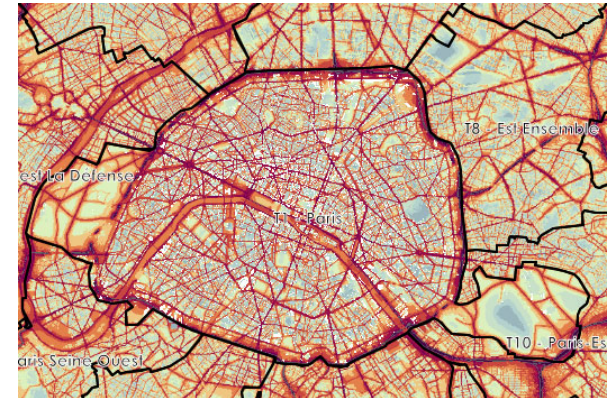
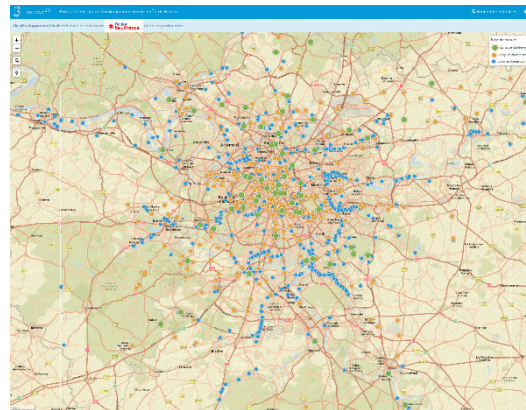
Population survey results  
Complaints



Short (>800) or long term  
(~150) measurements



Modelling and mapping



# ROAD NOISE: MAIN ISSUES

1. People mostly complain about high noise peaks.
2. High noise peaks represent most of the noise generated by traffic in the city as well as on touristic roads.
3. Due to acoustic masking, as long as very noisy vehicles remain present in the car fleet (heavy vehicles, buses, some motorcycles...) and/or as long as uncivil behaviours aren't addressed, improvements on passenger cars by the manufacturers or the increase in electric car numbers will lead to very little benefits on the overall noise situation.
4. For private vehicles, rolling noise is greater than engine noise, even at fairly slow speeds like 30 km/h. This is due to improvements on engine acoustic emissions. Therefore efforts should rather be geared towards reducing rolling noise.
5. The impact of development actions (road requalification, anti-noise road surfaces...) is much greater and more immediate than the effects of renewing the car fleet or tightening the norms.

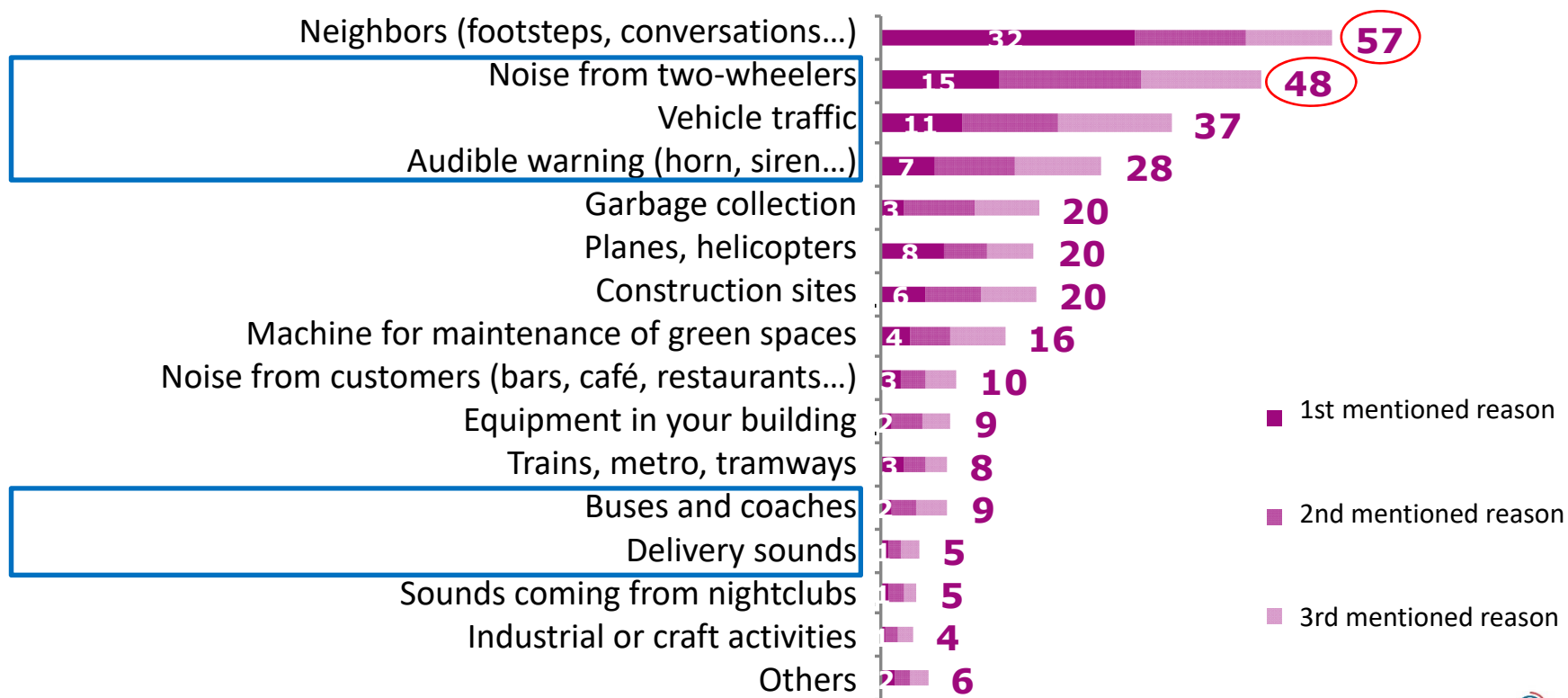
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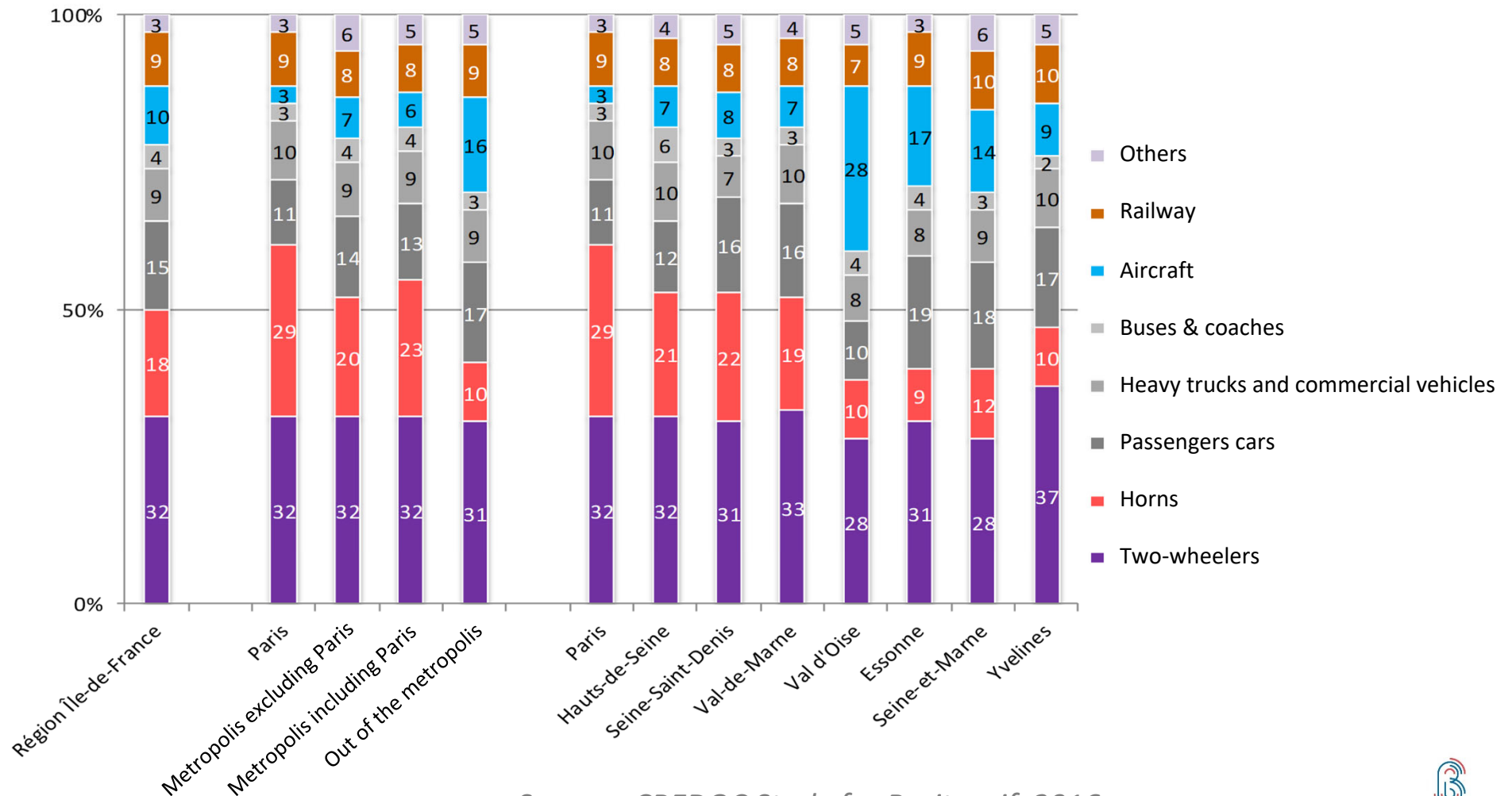
# THE MAIN SOURCES OF NOISE POLLUTION AT HOME

- For 36% of Ile-de-France residents, 1st reason = Road traffic noise
- For 32% of Ile-de-France residents, 1st reason = noise from neighbors
- In total, noise from neighbors (57%) and two-wheelers (48%) are the most mentioned



Source : CREDOC Study for Bruitparif, 2016

# THE TYPES OF NOISE CONSIDERED AS THE MOST ANNOYING AMONG TRANSPORT NOISE



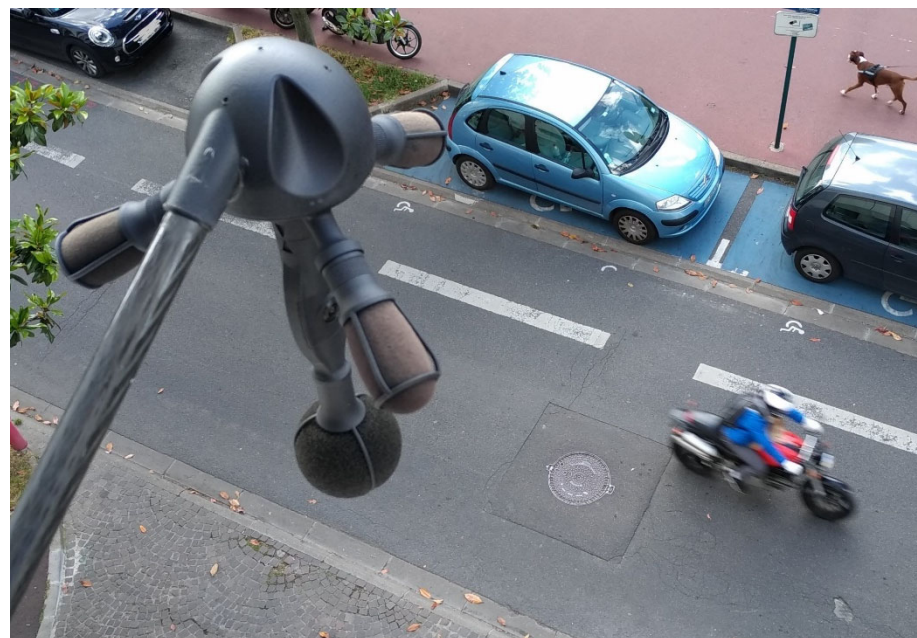
Source : CREDOC Study for Bruitparif, 2016

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# MEDUSA: THE ENVIRONMENTAL SENSOR WHICH ENABLES TO SEE NOISE

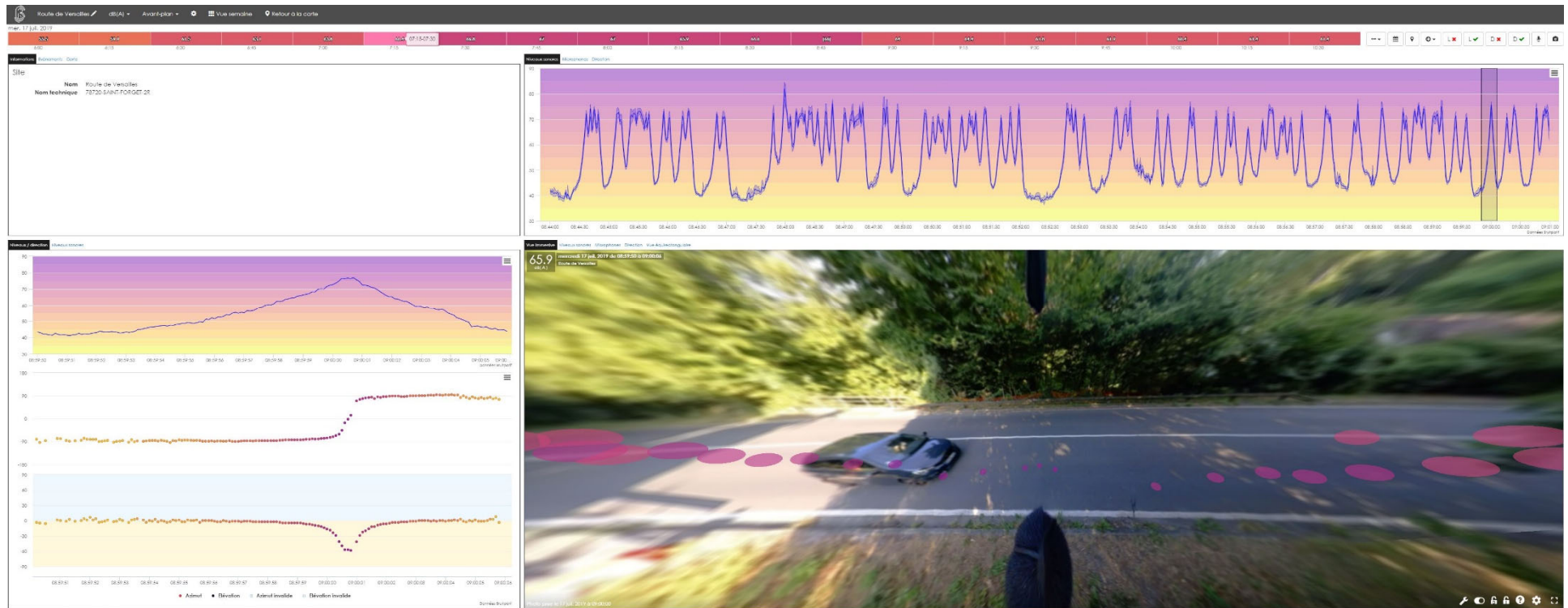
- **Tetrahedric shaped acoustic goniometer**  
Side length of about 20 cm with 4 microphones
- **Acoustic calculations**
  - LAeq, LCEq every 100ms
  - Dominant sound direction every 100ms  
azimuth and elevation angles  
1° precision
- **Imagery**
  - 360° photo every 15 mn
  - Blurring/masking on server
- **NO audio recording**  
→ Respects privacy laws
- **Can be installed on street lights or railings**
- **Patented system**
- **Winner of the French “Decibel d’Or” award**



LAUREAT 2019  
DECIBEL D'OR

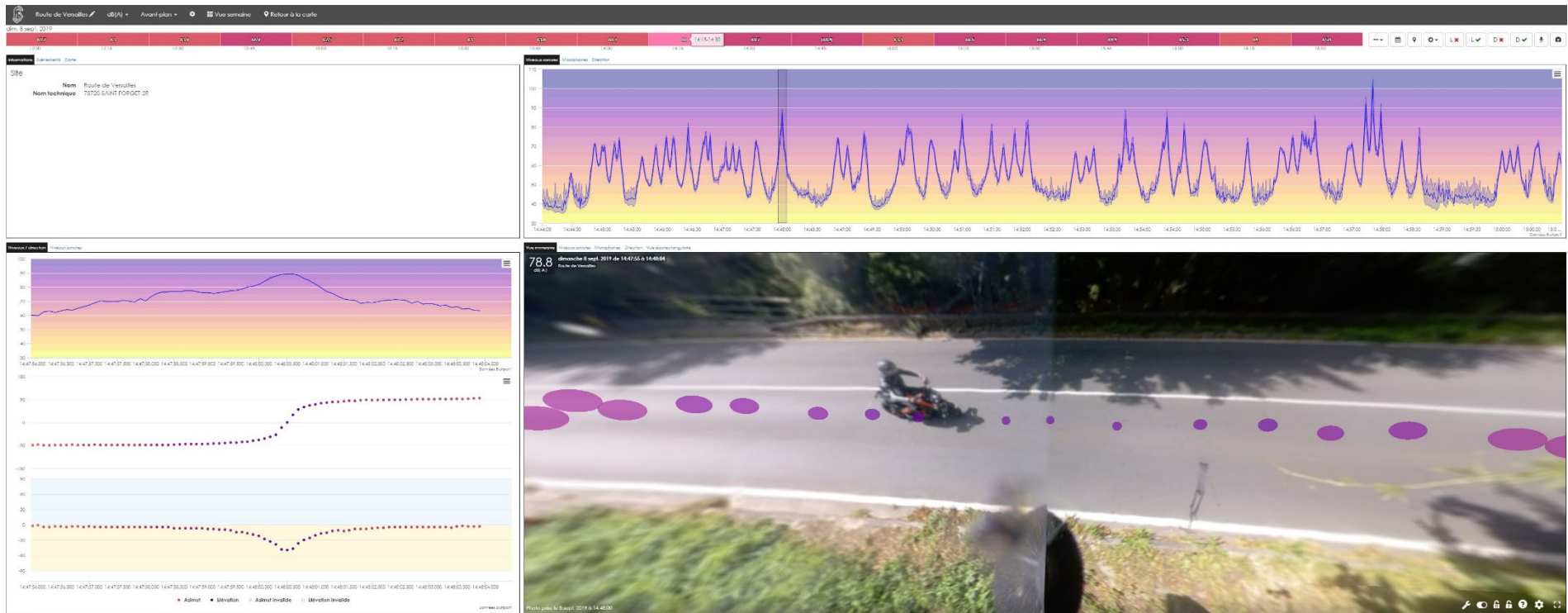
# THE NOISE PEAKS' ISSUE

## Passage of one passenger vehicle – max 77 dB(A)



# THE NOISE PEAKS' ISSUE

## Passage of one biker – max 90 dB(A)



# THE NOISE PEAKS' ISSUE

## Passage of one biker – max 112 dB(A)



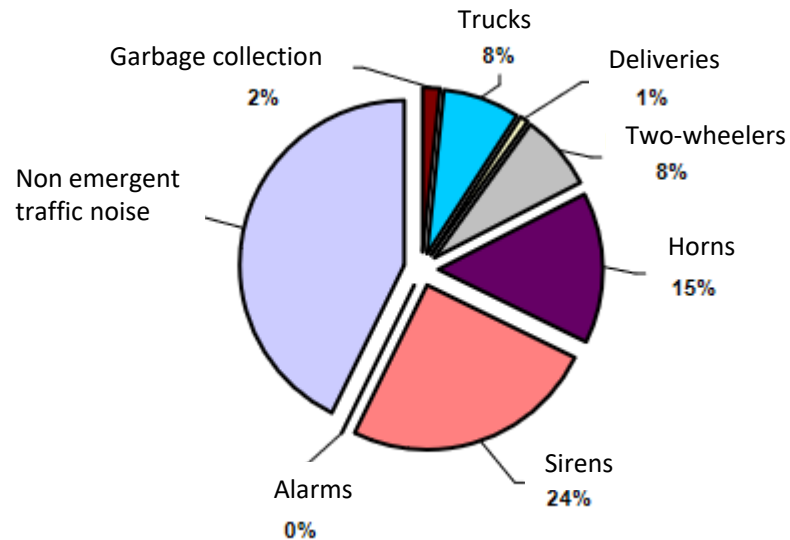
## THE NOISE PEAK'S ISSUE

### Case study: city center road (rue des haudriettes, Paris 3e)

556 noise peaks per day (253 high noise peaks with  $L_{Amax} > 80$  dB(A))

Main sources responsible for peaks (in number):  
**horns (37%), two-wheelers (29%), trucks (24%)**

**Contribution of noise peaks in ambient noise: 58%**





# THE NOISE PEAKS' ISSUE

## Results for rue Frémicourt, Paris 15

**High noise peaks with L<sub>Amax</sub> ≥ 80 dB(A)** (non-respect of homologation standards)

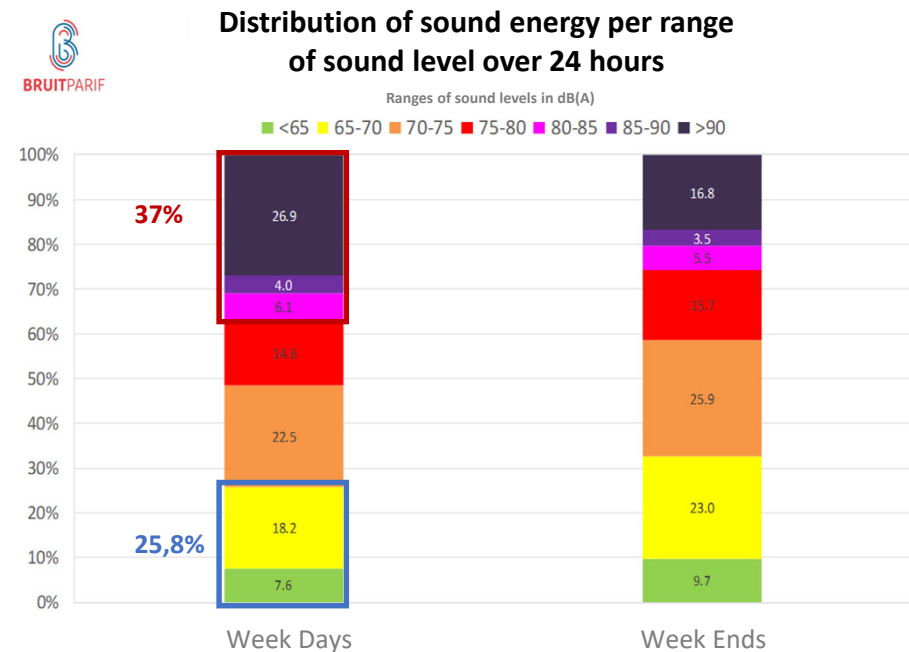
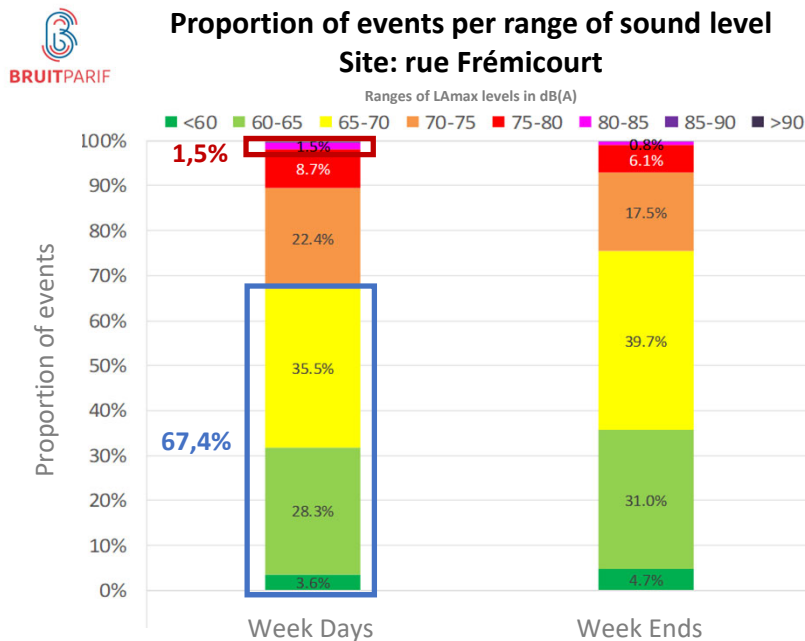
Represent less than 2% of the number of peaks due to vehicles

But are responsible for 37% (week days) of road noise

**Low noise peaks with L<sub>Amax</sub> < 70 dB(A)** (respect of ECE R21 regulation for Passengers cars)

Represent 2/3 of the number of peaks due to vehicles

But are responsible for only 1/4 of road noise



# THE NOISE PEAKS' ISSUE

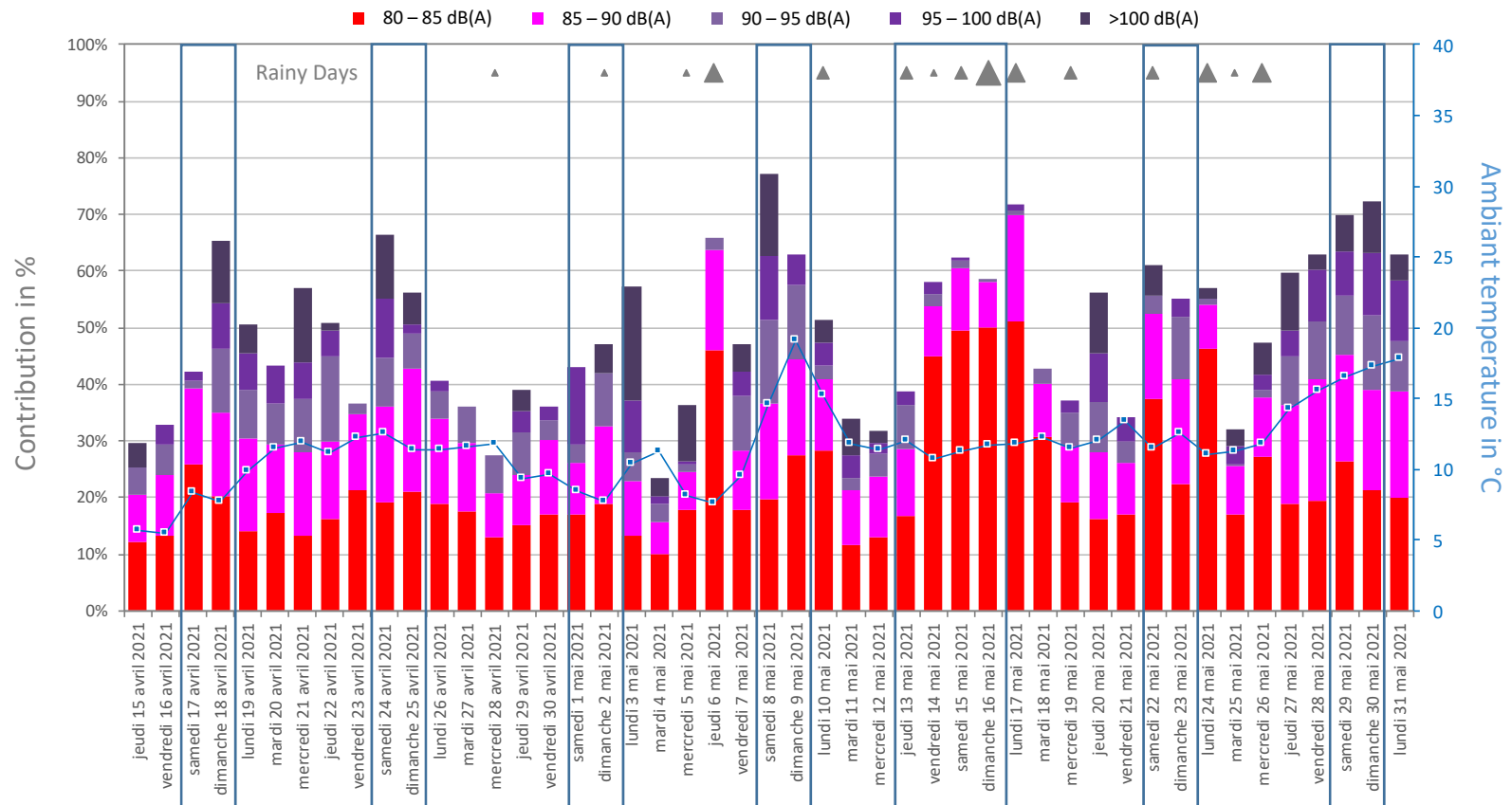
## Results for a touristic road (regional park Vallée de Chevreuse)

Number of high noise peaks with  $L_{Amax} \geq 80$  dB(A) per day: 376 (12,7% of events) in average (from 96 to 1049 depending on types of days and meteorological conditions).

These peaks are responsible for 54% of roadway noise (between 23% and 77%).

### Contribution (in %) to the traffic noise of events exceeding 80dB(A)

(scaled to equivalent sound level 7.5 m off road axis)



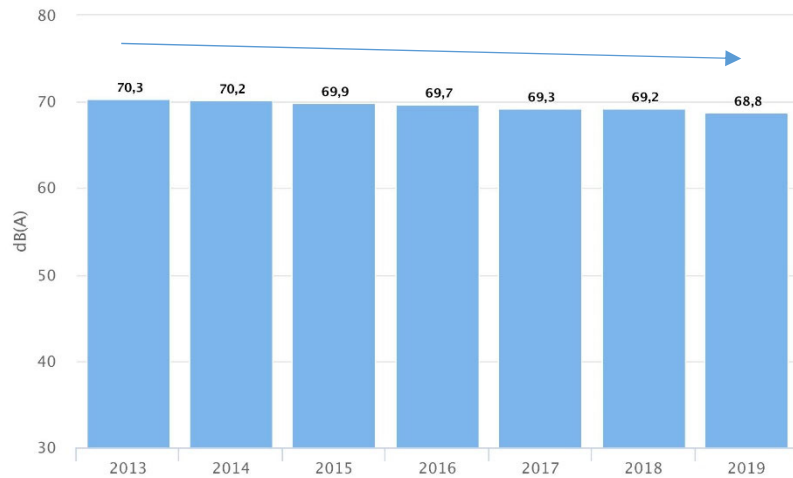
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1. People mostly complain about high noise peaks.
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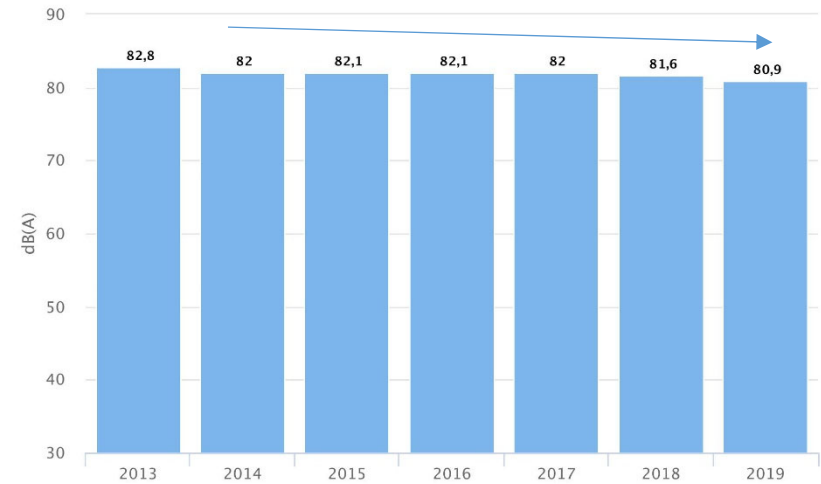
# WHAT CHANGES OBSERVED FOR ROAD NOISE IN ENVIRONMENT?

A slight decrease observed through the Bruitparif measurement network around -0,2 dB(A) per year

### National road in Pantin



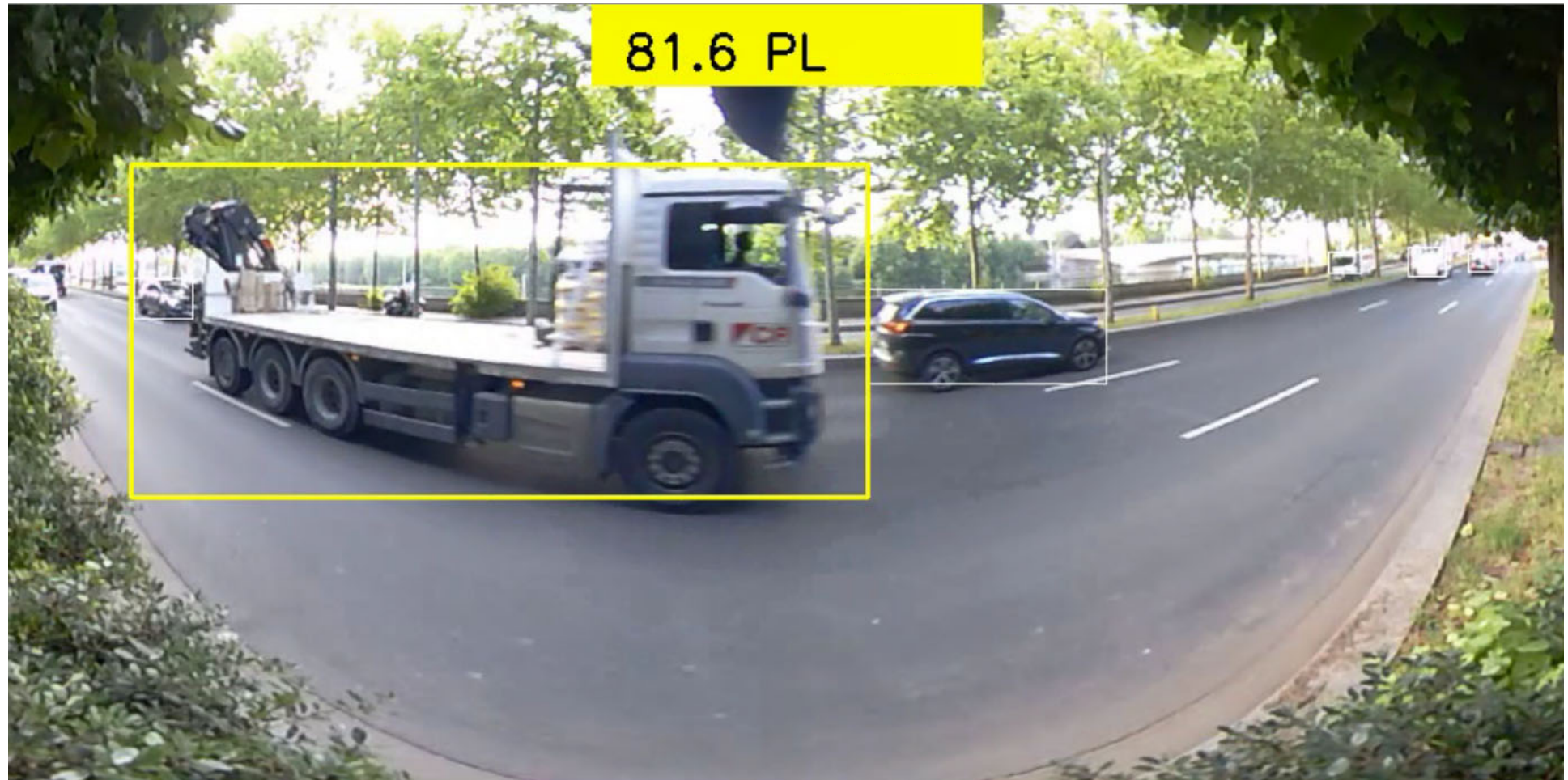
### Paris ring road (Pte d'Auteuil)



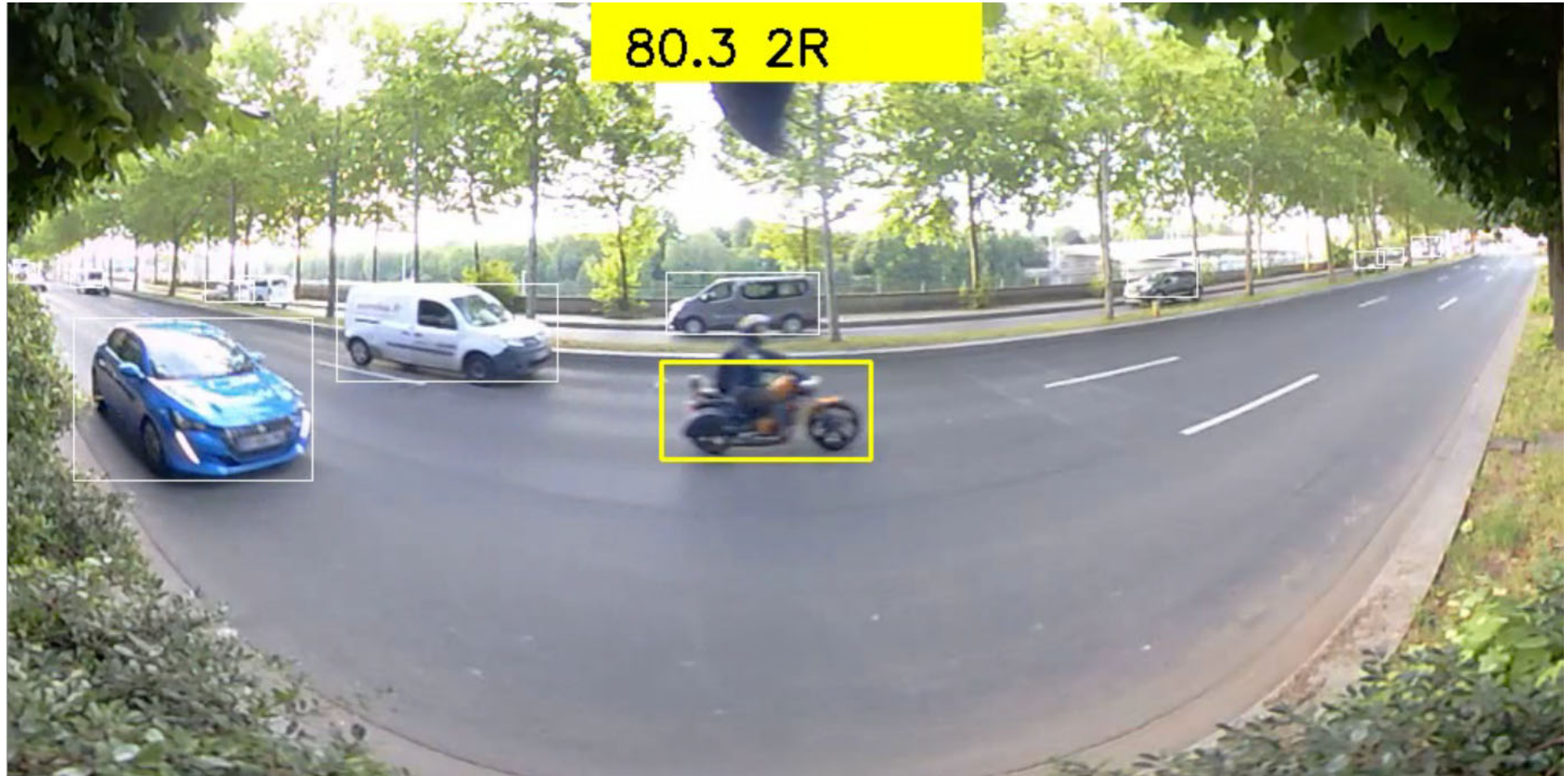
### City center - Place St Michel



# ACOUSTIC MASKING EFFECT



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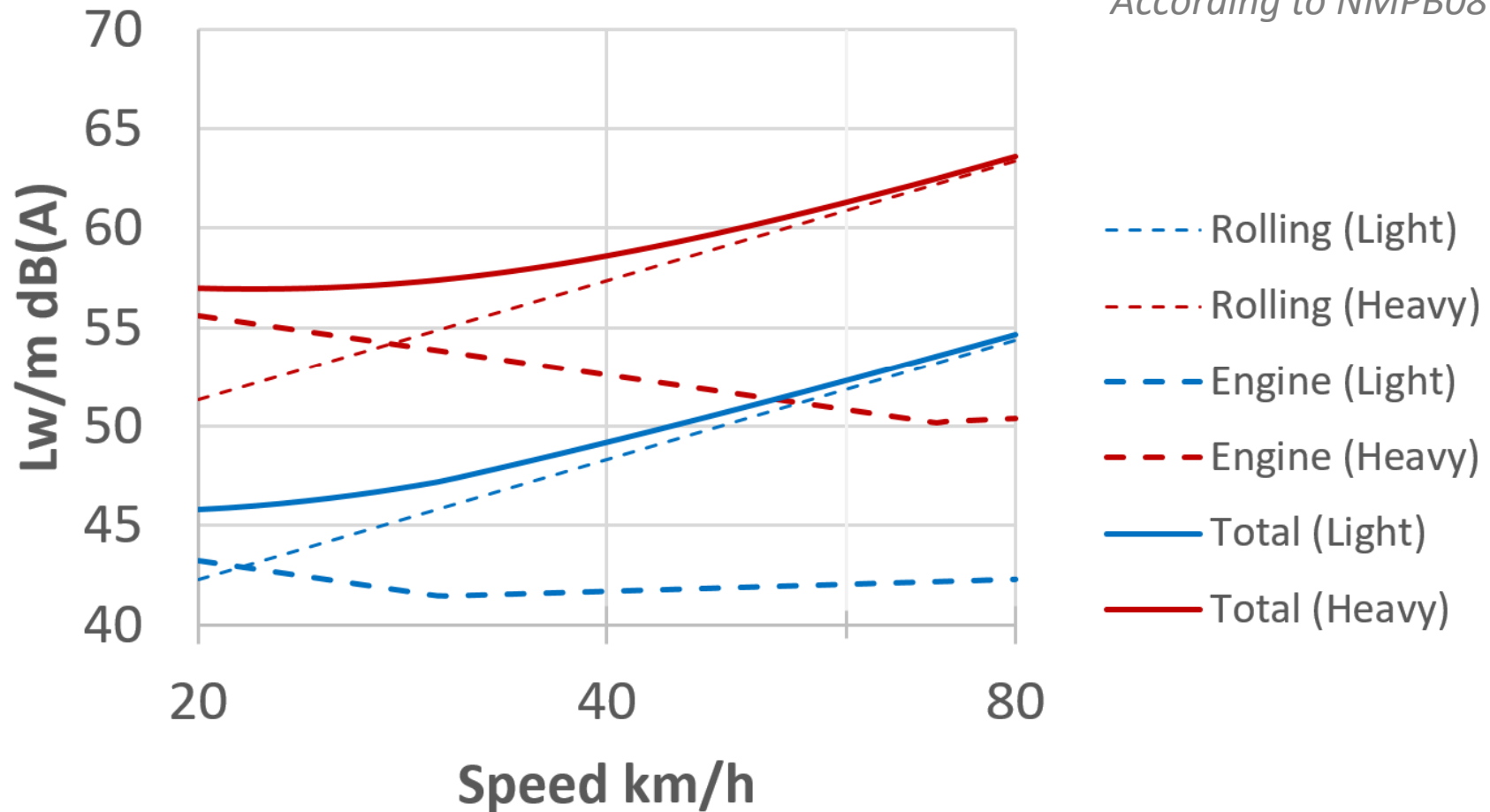
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# PREDOMINANCE OF ROLLING NOISE

## Sound emission power over speed

*According to NMPB08*



**!/ Pay attention not to re-increase engine noise in city centers due to AVAS systems on electric vehicles!**



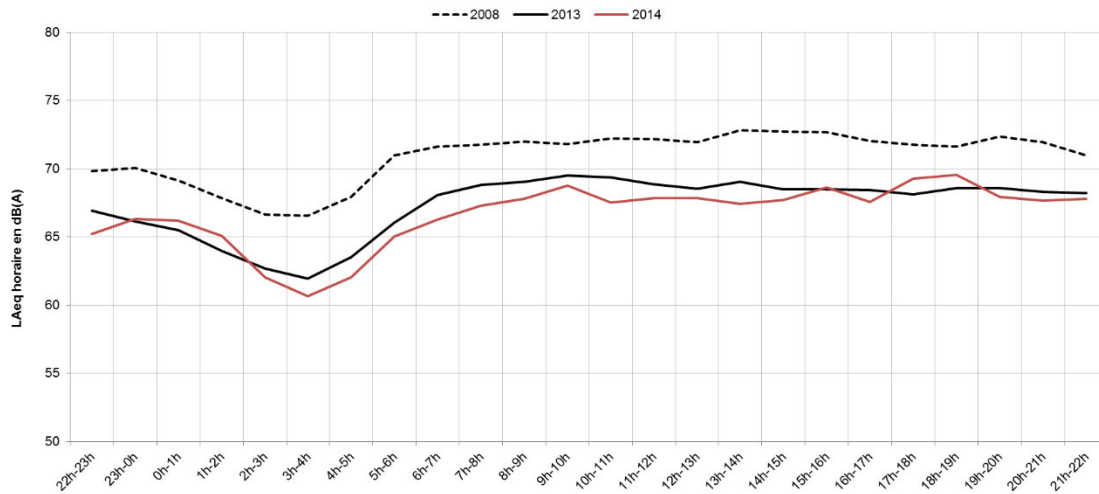
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# EXAMPLES OF ROAD IMPROVEMENTS ASSESSED BY BRUITPARIF

## Rearrangement of the RN1 (National Road) at Pierrefitte-sur-Seine

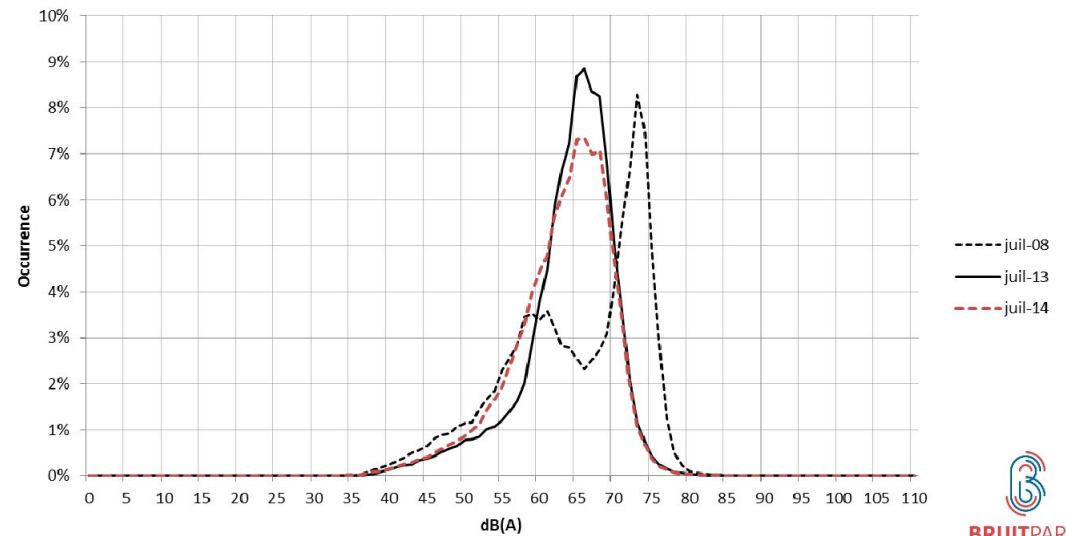
Hourly distribution of average sound level  
Working days – after treatment



A reduction around 4 dB(A) during nighttime and 3,5 dB(A) during daytime

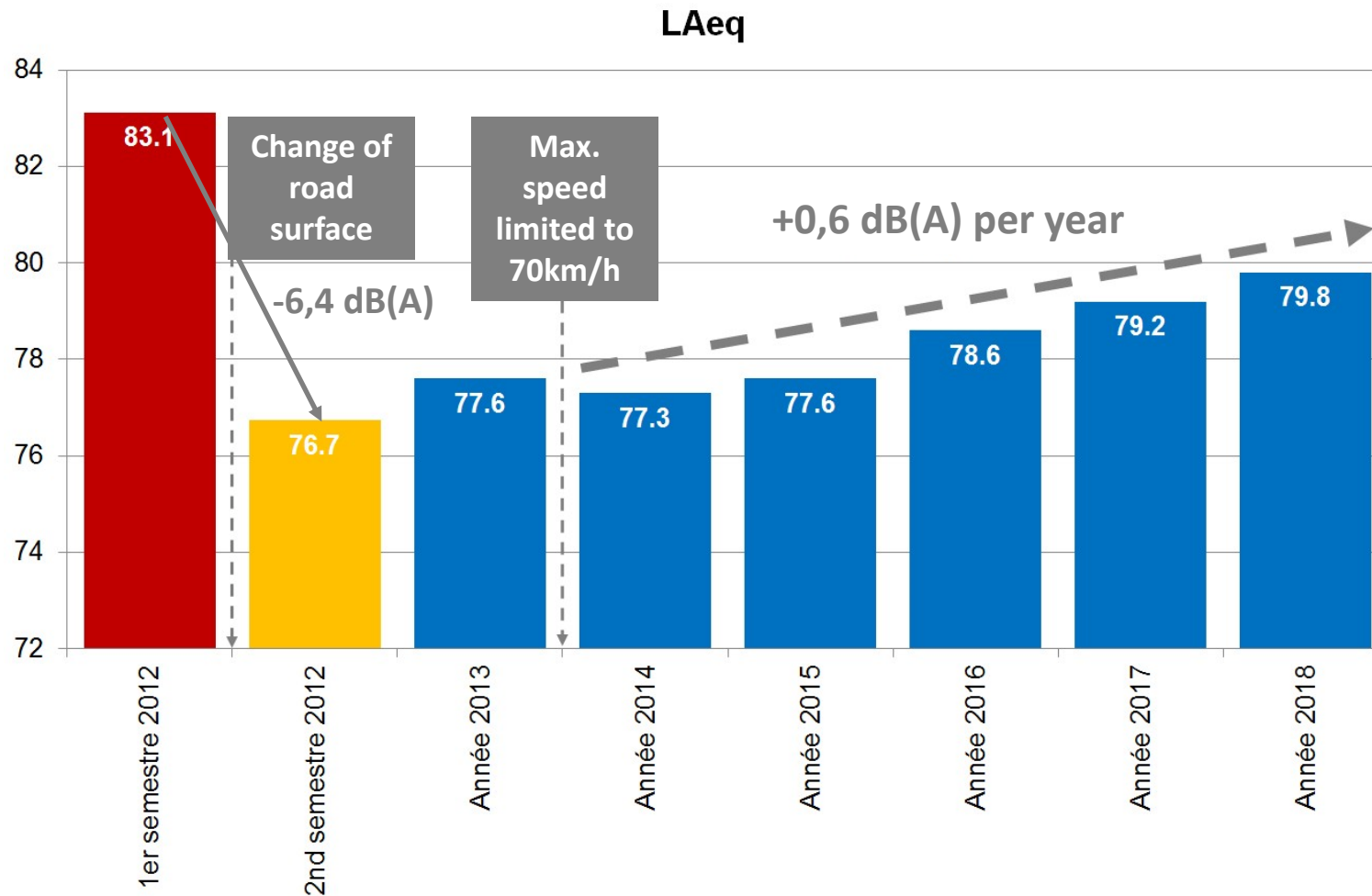
Less pulsed and more fluent traffic resulting in fewer peaks

Noise level distribution LAeq,1s



# EXAMPLES OF ROAD IMPROVEMENTS FOLLOWED BY BRUITPARIF

## Installation of anti-noise road surfaces Paris ring road (Pte de Vincennes)

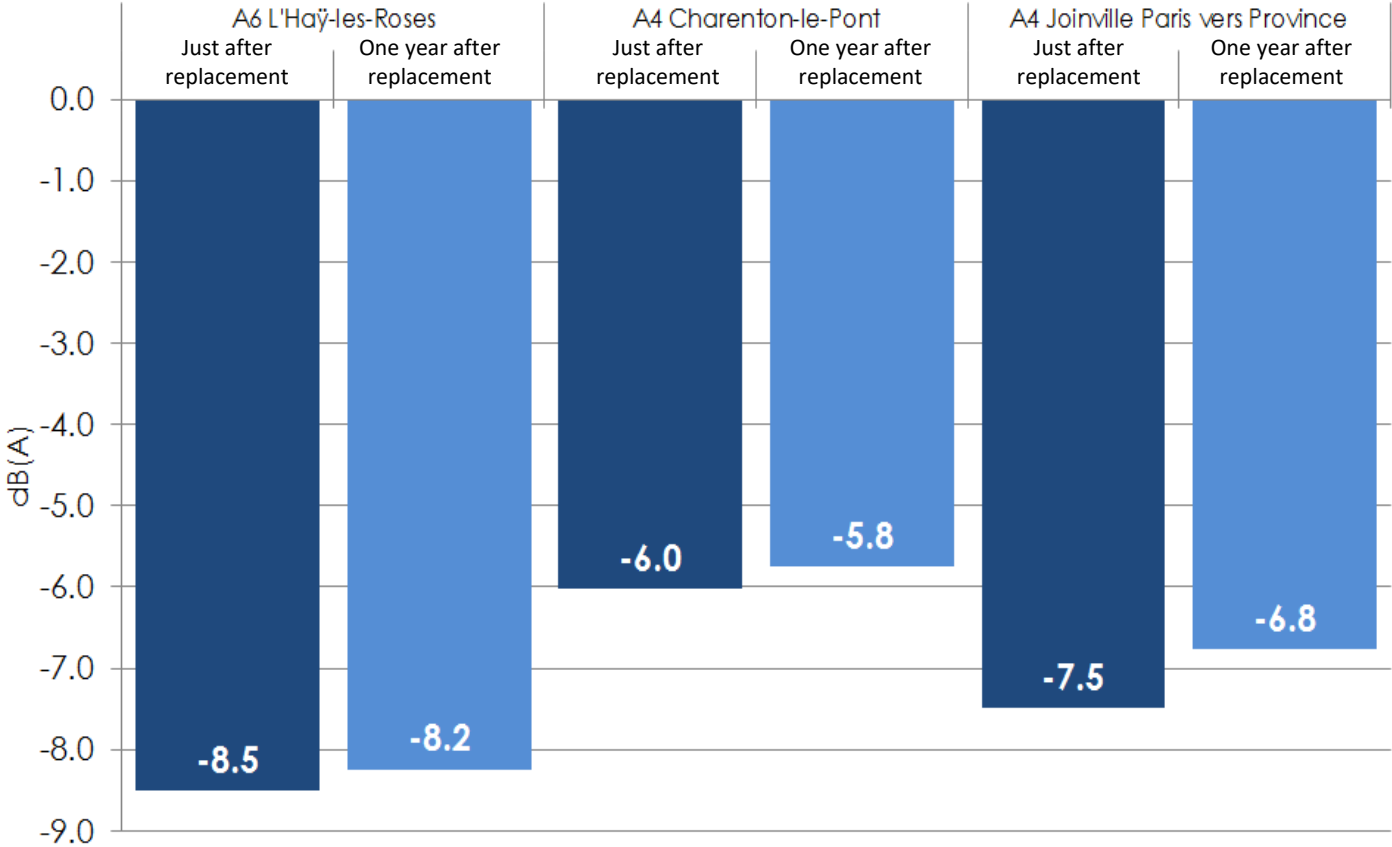


# EXAMPLES OF ROAD IMPROVEMENTS FOLLOWED BY BRUITPARIF

## Installation of anti-noise road surfaces

### A6 and A4 motorways

Evolution of LAeq 24h before / after replacement of the road surface



# NEGATIVE EFFECTS OF SPEED BUMPS

## DES ASSOCIATIONS "ANTI DOS D'ÂNES" POINTENT DU DOIGT LE BRUIT ET LA POLLUTION QU'ILS GÉNÈRENT

Julien Bonnet Le 02/07/2021 à 6:07



Un Peugeot 3008 avec le moteur essence 1,2 litre de 130 chevaux faisait partie du protocole de tests pour évaluer l'effet "surconsommation" des ralentisseurs. - Ligue de défense des conducteurs

Source : [www.bfmtv.com](http://www.bfmtv.com)

## Pollution, bruit, surconsommation : les ralentisseurs dans le viseur d'associations de conducteurs

**DÉCRYPTAGE** - Trois associations, dont la Ligue de défense des conducteurs, ont mené une expérience pour démontrer les nuisances de certains ralentisseurs, qu'ils jugent illégaux, en matière de consommation, mais surtout d'émission de CO<sub>2</sub>.

Par **Hugues Maillot**

Publié le 02/07/2021 à 17:13

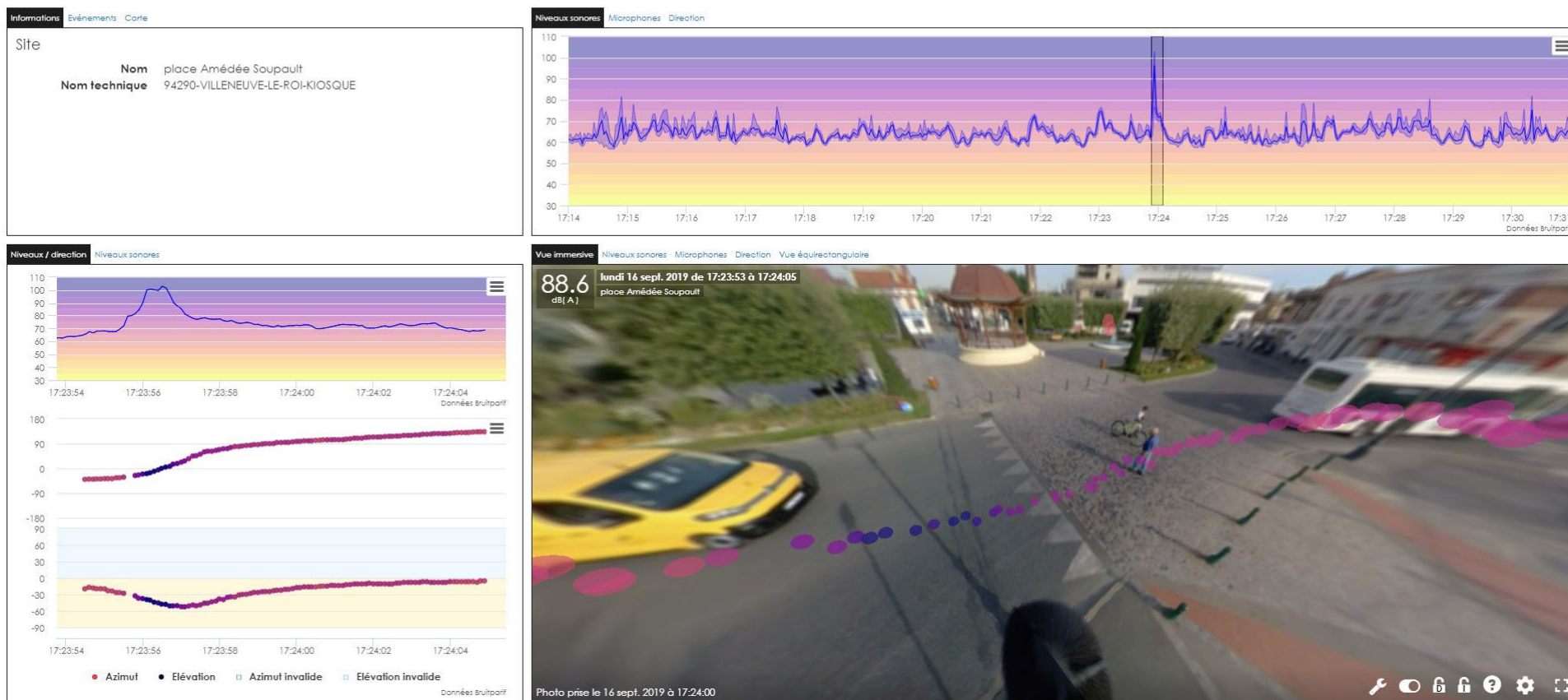


Image tirée de l'expérience des associations sur les ralentisseurs. Ligue de Défense des Conducteurs 2021

Source : [www.lefigaro.fr](http://www.lefigaro.fr)

# EXAMPLE OF NEGATIVE EFFECT OF A SPEED BUMP ON NOISE ENVIRONMENT

## Passage of a bus on a speed bump – max 103 dB(A)



# WHAT CHANGES OBSERVED FOR ROAD NOISE IN ENVIRONMENT?

## Ring road study over 10 years : main results

Decrease in dB(A)	Day Time (6am-10pm)	Night Time (10pm-6am)
10% less traffic over 10 years	-0,5	---
Decreased speed limit from 80 to 70 km/h	0 → -0,5	-1 → -1,5
Car fleet renewal	-0,3	-0,3
Anti-noise road surfaces (when applicable)	-2,4 → -3,2	-3,2 → -4,4
<b>Total</b> (with standard road surface)	<b>-0,8 → -1,3</b>	<b>-1,3 → -1,8</b>
<b>Total</b> (with anti-noise road surface)	<b>-3,2 → -4,5</b>	<b>-4,5 → -6,2</b>

# PRIORITIES FOR ACTION TO REDUCE ROAD NOISE

1. **Fight against uncivil behaviours (uncertified exhausts, engine overdrive, abuse of horn and audible warning devices...)**

**Means: raising awareness, prevention campaigns + strengthen sanction system (noise radar, increase road control)**

2. **Act on rolling noise**

**Means: good maintenance of roads + install anti-noise road surfaces + lower traffic speed**

3. **Create conditions for relaxed driving (smooth and calm, no sudden changes or nervousness)**

**Means: 30 or 20 km/h areas being careful not to create congestion, less and more optimized signal lights (green waves, smart network...), avoid speed bumps**

4. **Focus first on the noisiest vehicles**

**Means: Encourage transition to natural gas/electric/hydrogen of heavy vehicles + tighten norms for heavy vehicles (M3, N3) and light utility vehicles (M2,N2) (efficiency/cost ratio greater than for passenger cars)**



**THANK YOU FOR YOUR ATTENTION**

**More info: [www.bruitparif.fr](http://www.bruitparif.fr)**

