



London Air Quality Network Seminar

**Progress towards attainment of
EU Limit Values and
PM_{2.5} measurement in Paris**

21st September 2010

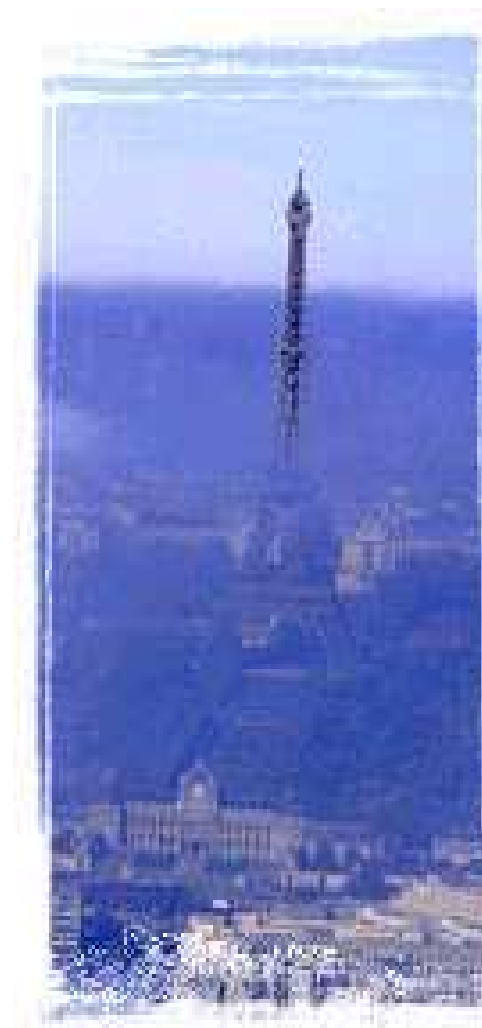
Véronique Gherzi, Airparif

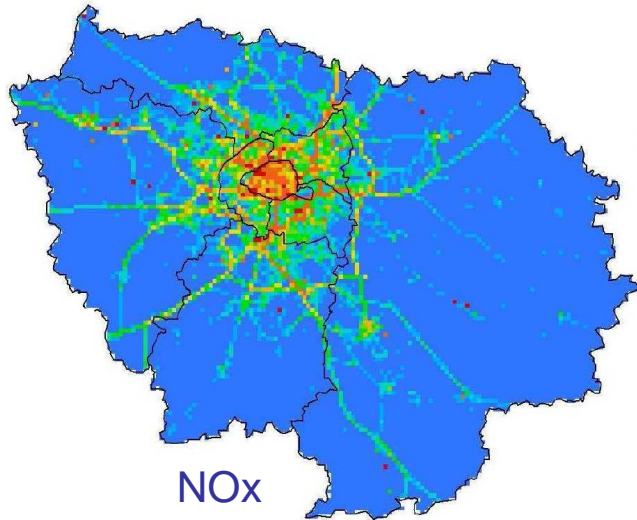
Highly urbanized and densely populated:

- **Ile-de-France region :**
11 million inhabitants, 12 000 km²,
- **Paris Agglomeration :**
9.6 million inhabitants, 2600 km²,
4.5 million personal vehicles
128 million km/day,
800 km of highways and express roads

⇒ **IDF ~ 10 % of the national emissions**

**Meteorological conditions and landscape:
good dispersion**





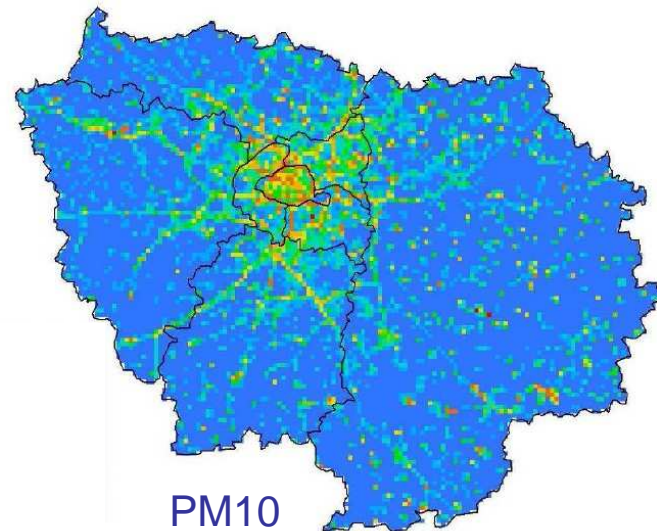
Agglomeration of Paris :

High density of :

- urbanization
- roads

⇒ very high density in Paris and its agglomeration for all the pollutants

⇒ decreasing density : a factor between 6 and 8 between Paris and the surrounding rural areas



Nox Emission density (2000)



Specificity of the emission density in the Paris agglomeration:

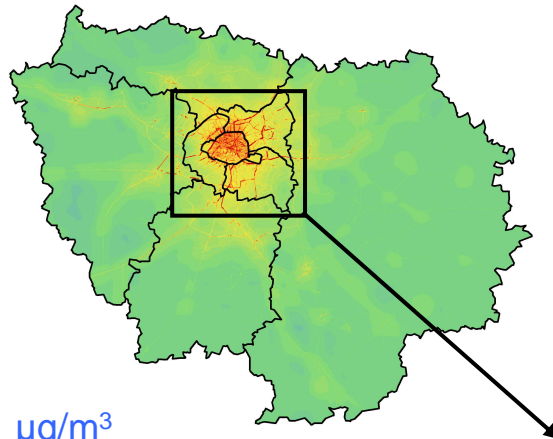
- **very high emission density localized on a restricted area,**
- **amount of pollutants emitted per inhabitant lower** than in most of the French regions
- Situation comparable to London

Urbanized areas and public exposure : NO₂

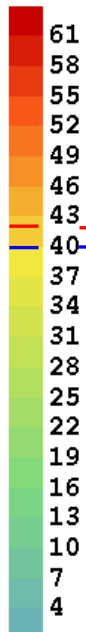
Public exposure in Ile-de-France in 2009 :

about 3.4 million of citizens

exposed to an air > EU Limit Value 2010*



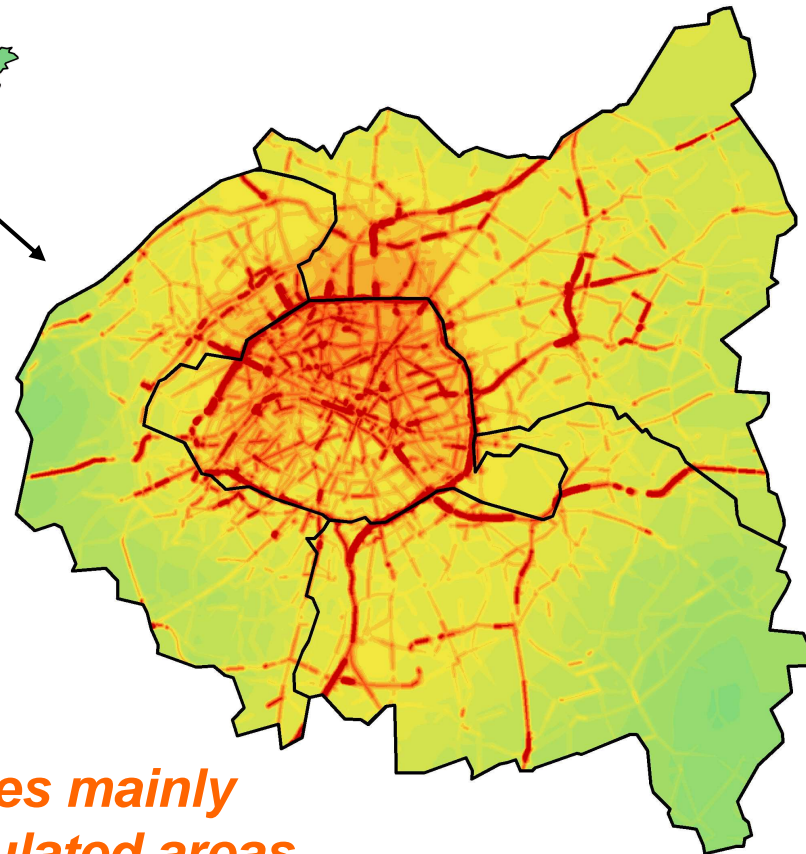
µg/m³



Limit Value 2009 :
42 µg/m³

Limit Value 2010 :
40 µg/m³

**Exceedances mainly
in highly populated areas**



= 31% of population,

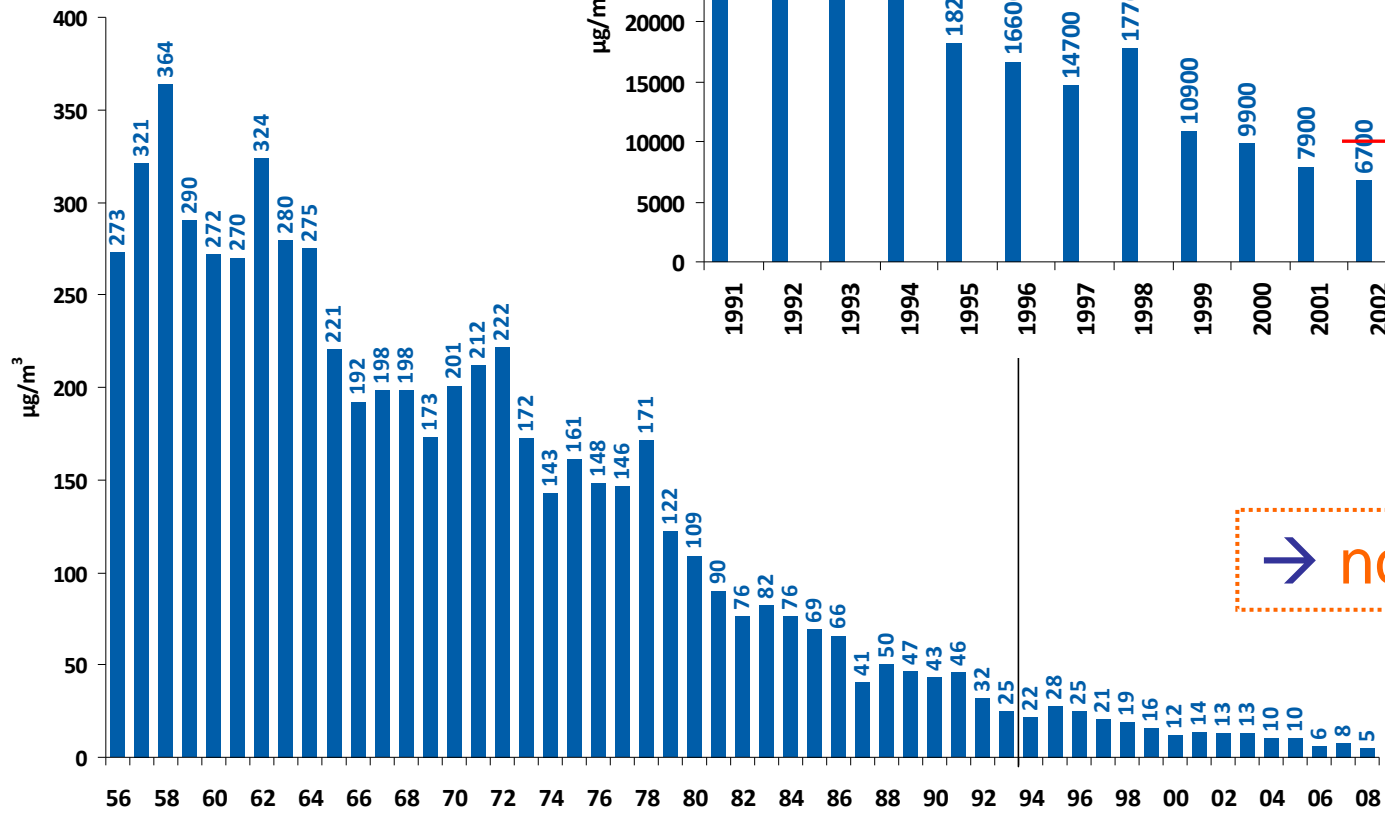
= 2000 km

(~ 20% of the modelised
road network)

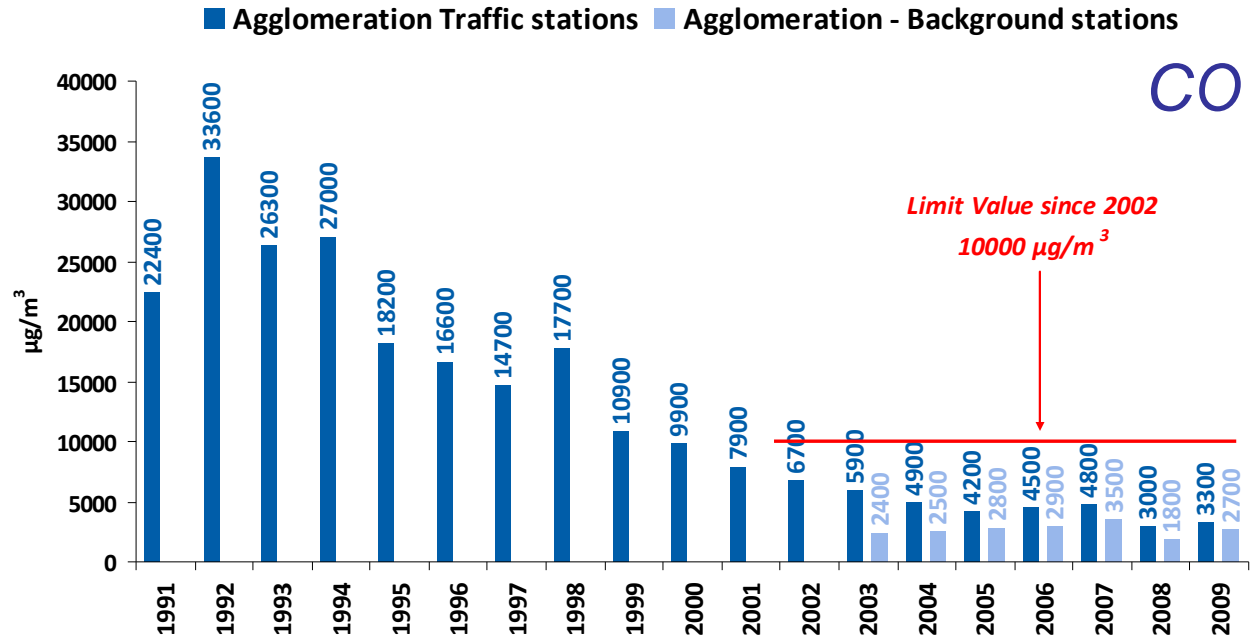
* 40 µg/m³ annual mean

	Trend 2000-2009		Limit Value		Target Value	
	Far from traffic	Near traffic	Far from traffic	Near traffic	Far from traffic	Near traffic
PM10	→	→	Exceed	Exceed		
PM2.5	→	→	Comply	Exceed	Comply	Exceed
NO₂	↓	→	Exceed	Exceed		
O₃	↗				Comply	
Benzene	↓	↓	Comply	Comply		

SO₂

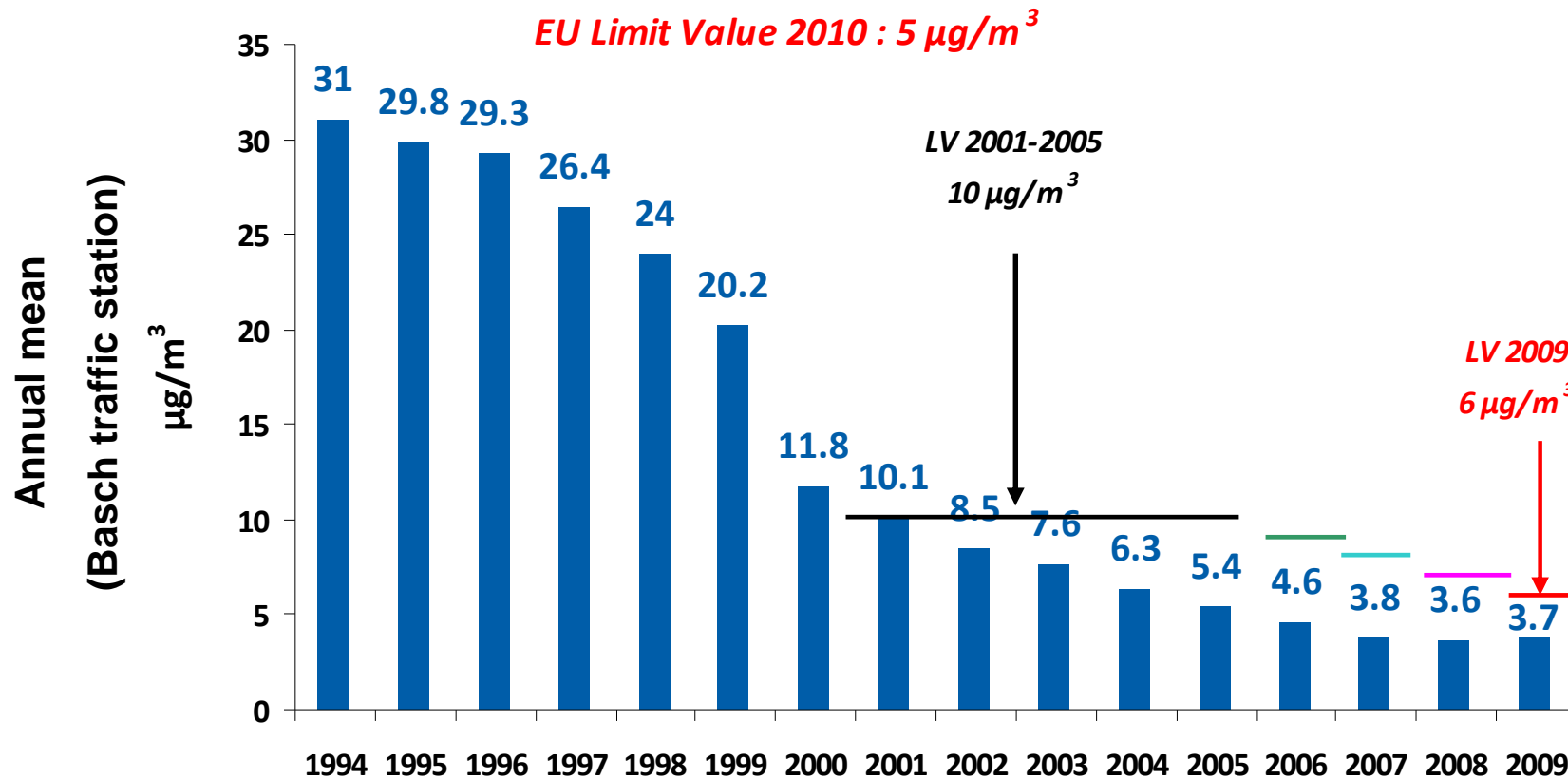


CO



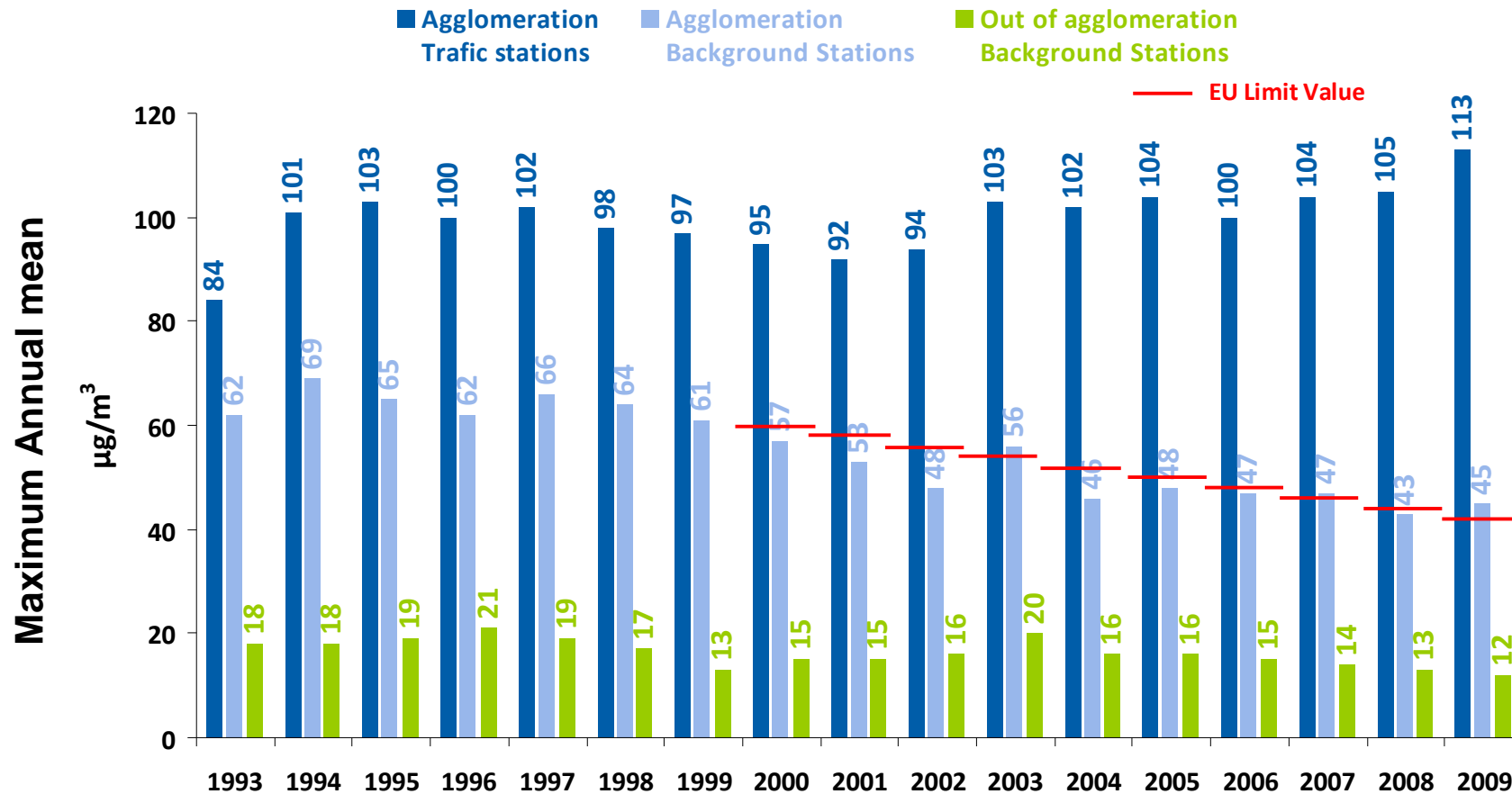
➔ no longer issues

Benzene : an issue near traffic only



- End of a long period of decrease
- **Compliance with EU Limit Value (6 µg/m³)**
- French Quality Objective (2 µg/m³) **exceeded**

over less than 1000 km of roads, 1 million people concerned

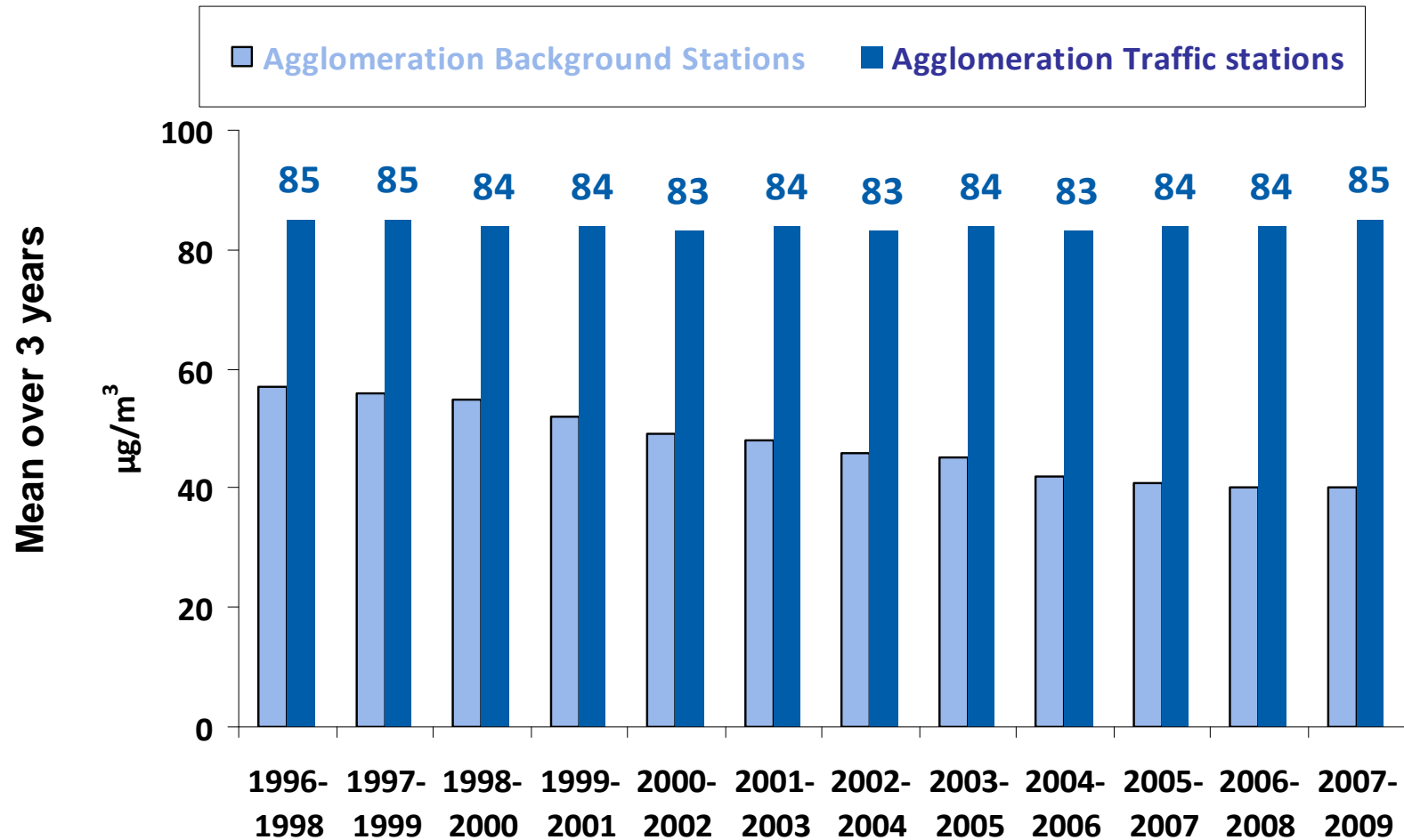


➤ **2010 EU Limit Value exceeded:**

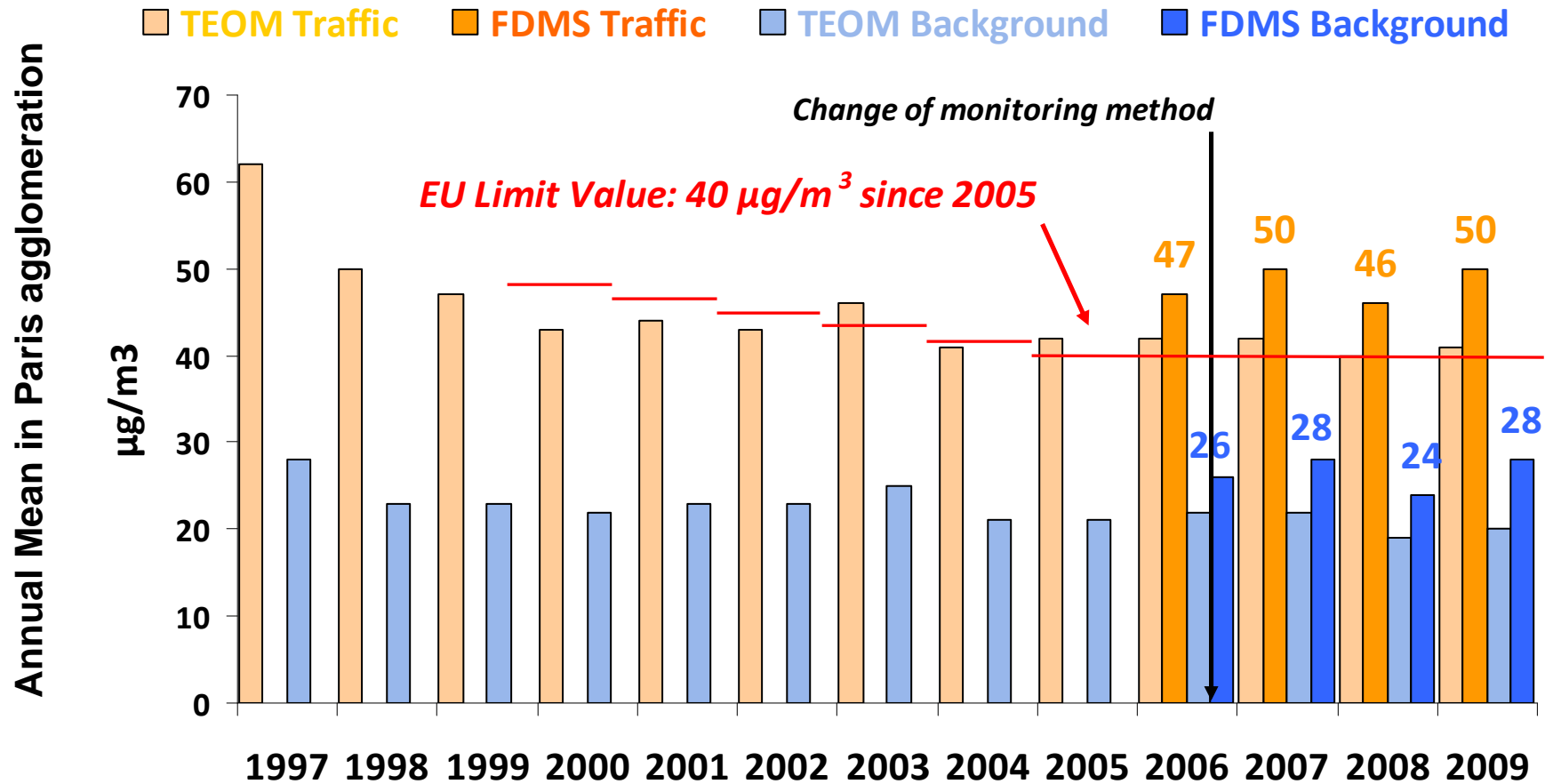
- Near and far from road traffic (270 km², ~ 20% of the modelised road network)

- **Traffic stations: twice above the EU Limit Value**

Focus on key pollutants : **NO2**

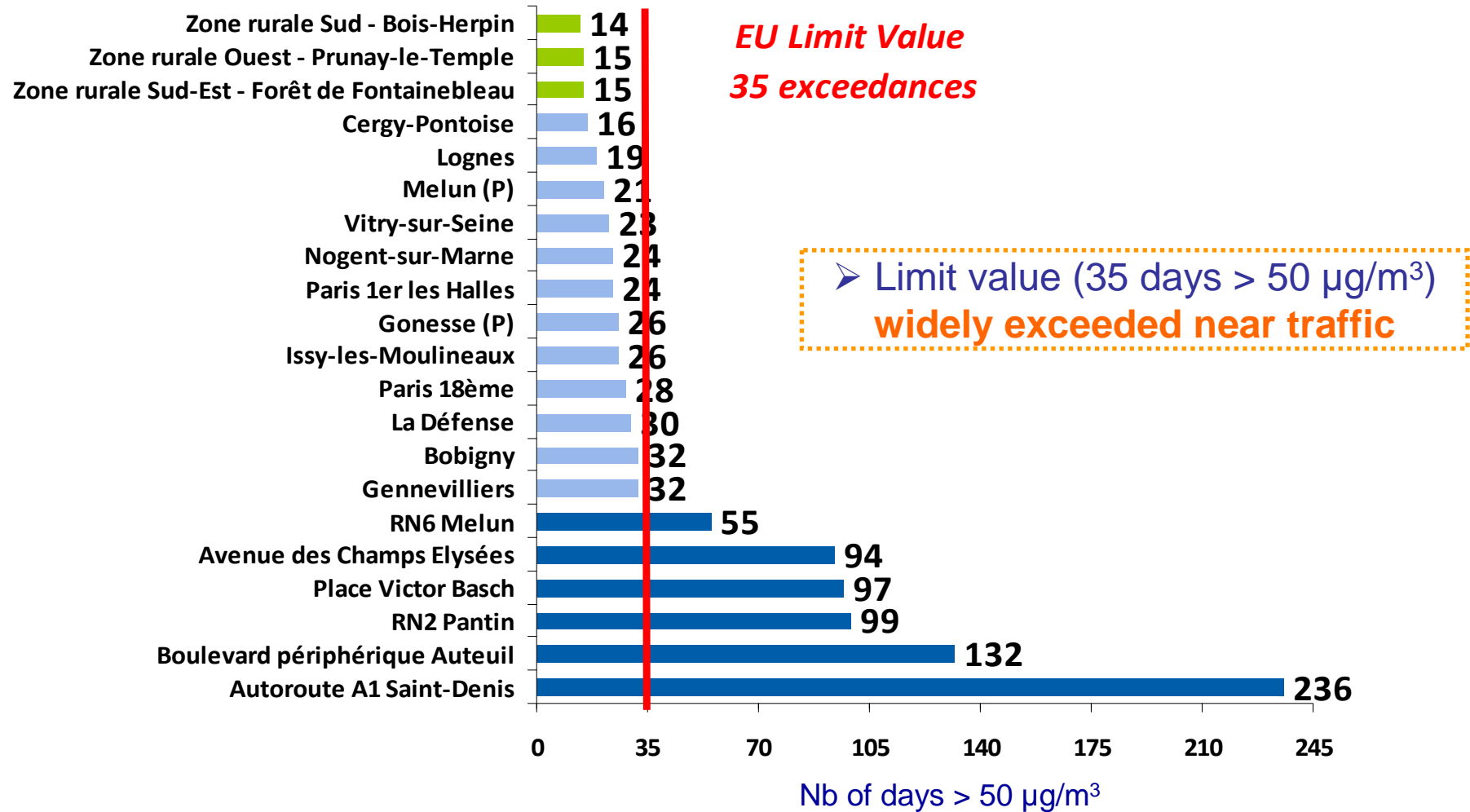


- **Traffic stations: rather stable levels**

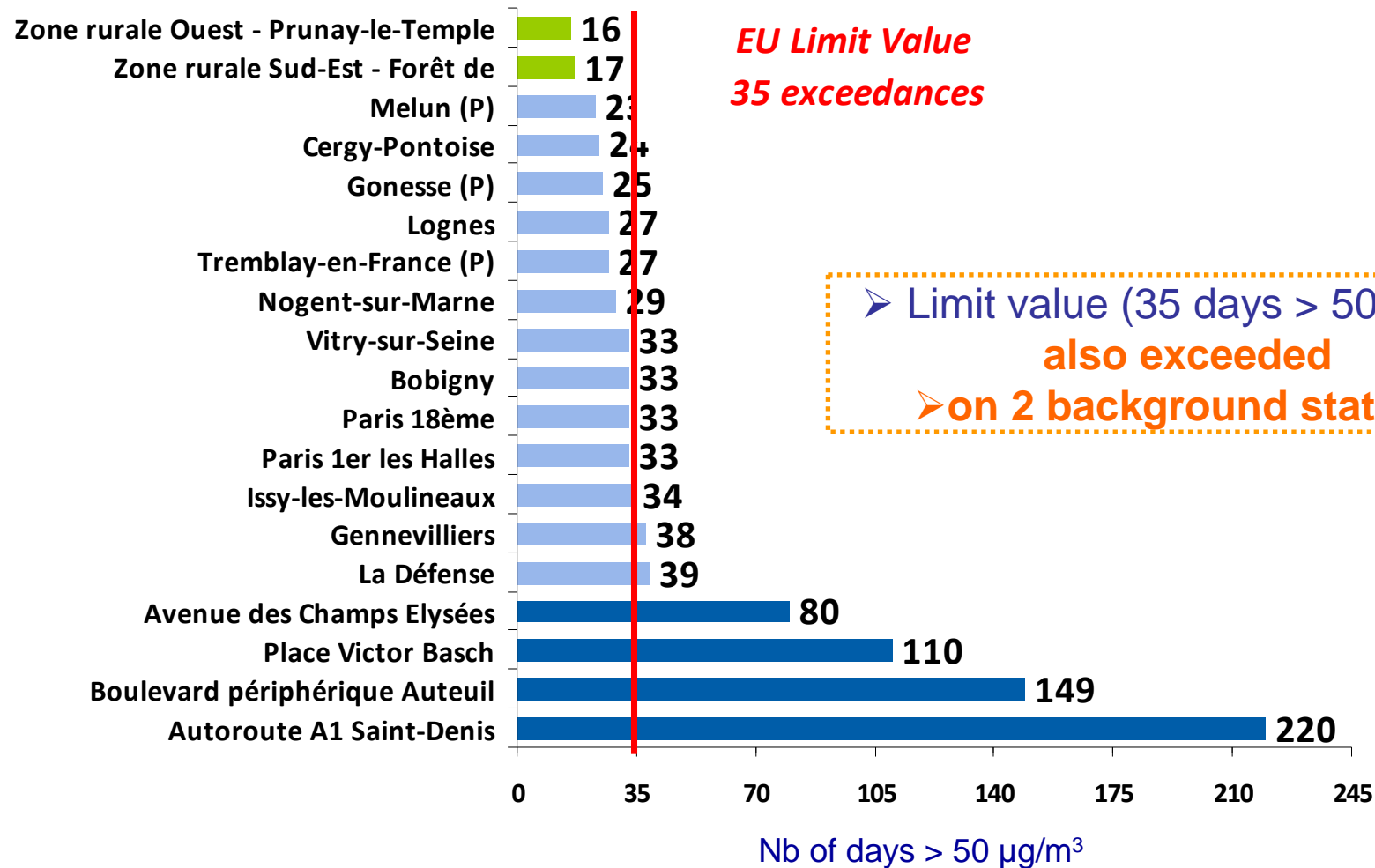


- General improvement (background + traffic) since 1997:
 -18% in background and -32% in traffic conditions
- But stable since 2000

■ traffic stations
 ■ urban and suburban (P)
 ■ rural stations

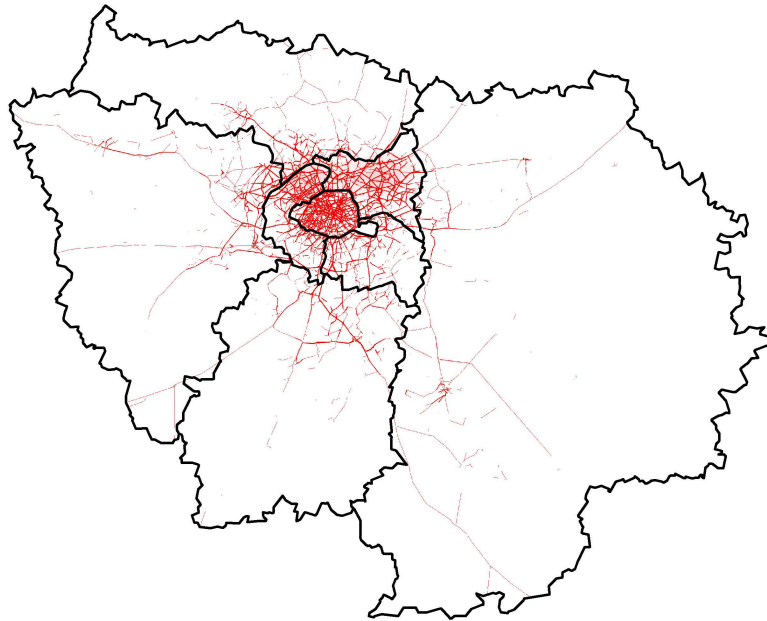


■ traffic stations
 ■ urban and suburban (P)
 ■ rural stations

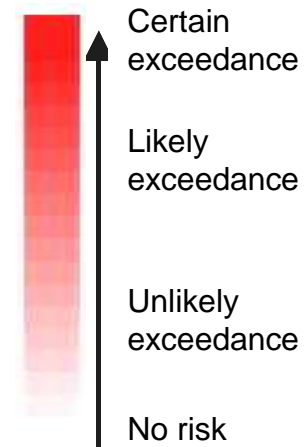


Risk of exceedance of the PM10 daily limit value

Public exposure in Ile-de-France :
2,8 million of citizens
exposed to an air > limit value
(daily mean > 50 $\mu\text{g}/\text{m}^3$ more than 35 days a year) in 2009

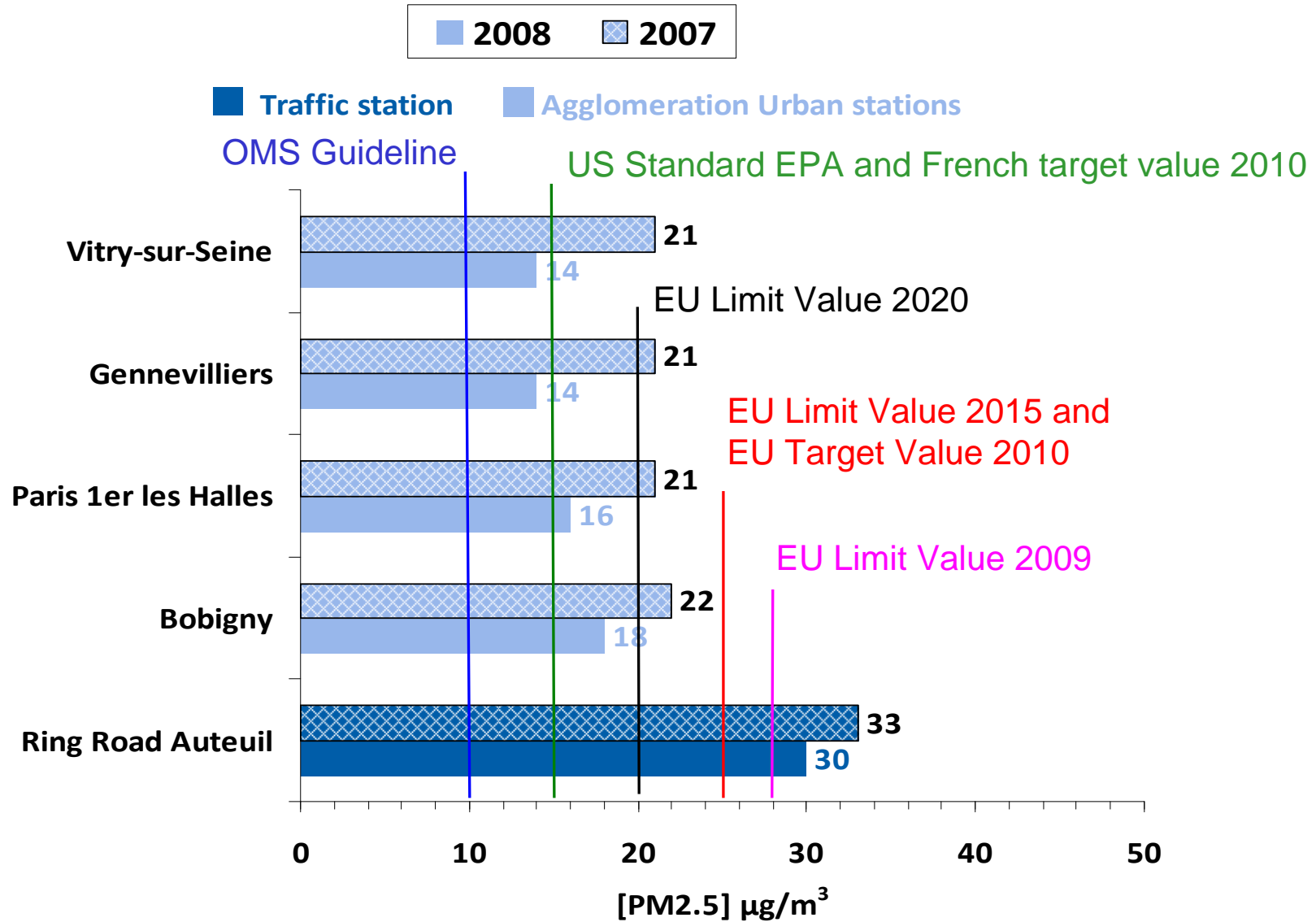


Risk of exceedance of
35 days $\geq 50 \mu\text{g}/\text{m}^3$



Focus on key pollutants : *Particles*

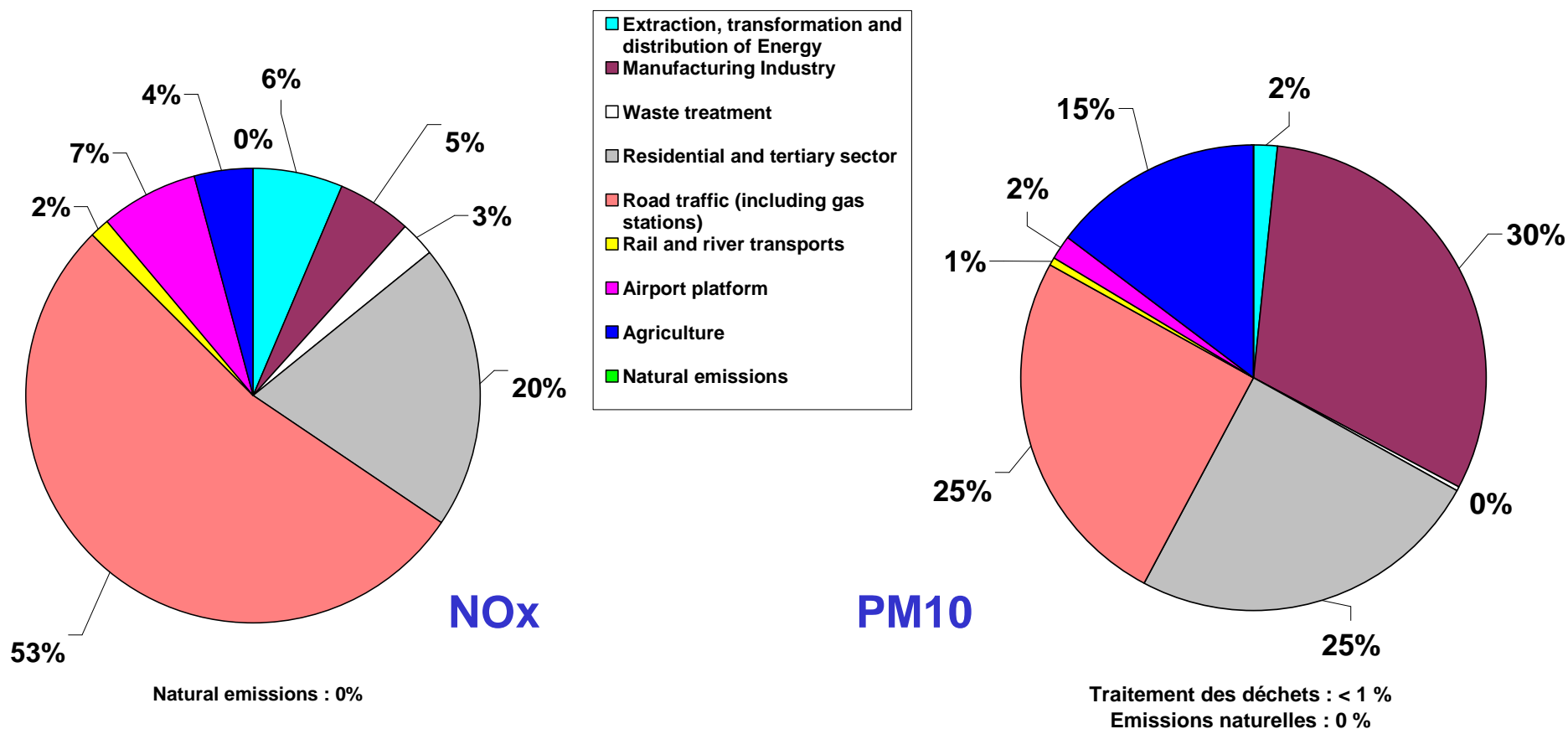
PM2.5 Annual Mean



Road transport: Major contributor to the pollutants emissions in Ile-de-France

⇒ 50 % of the NOx and CO regional emissions,

⇒ about 25% of the PM10 regional emissions





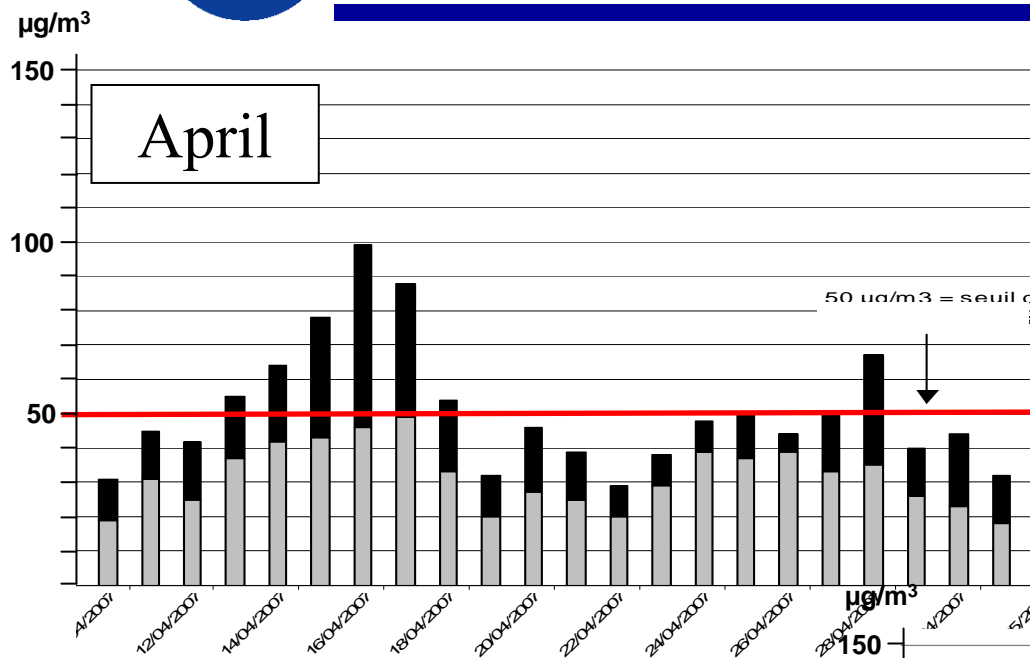
**Winter pollution episodes
(NO₂ and particles- 24 dec 2007)**

AQ Index = 10

View from the 3rd floor of the Eiffel Tower

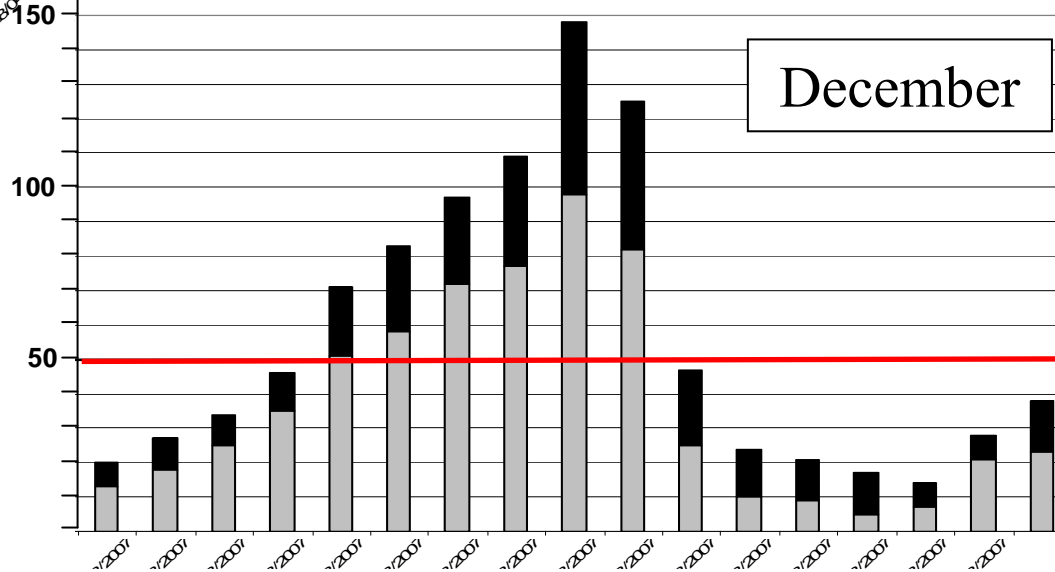


Winter pollution episodes in 2007 PM10 Site of Gennevilliers (background)



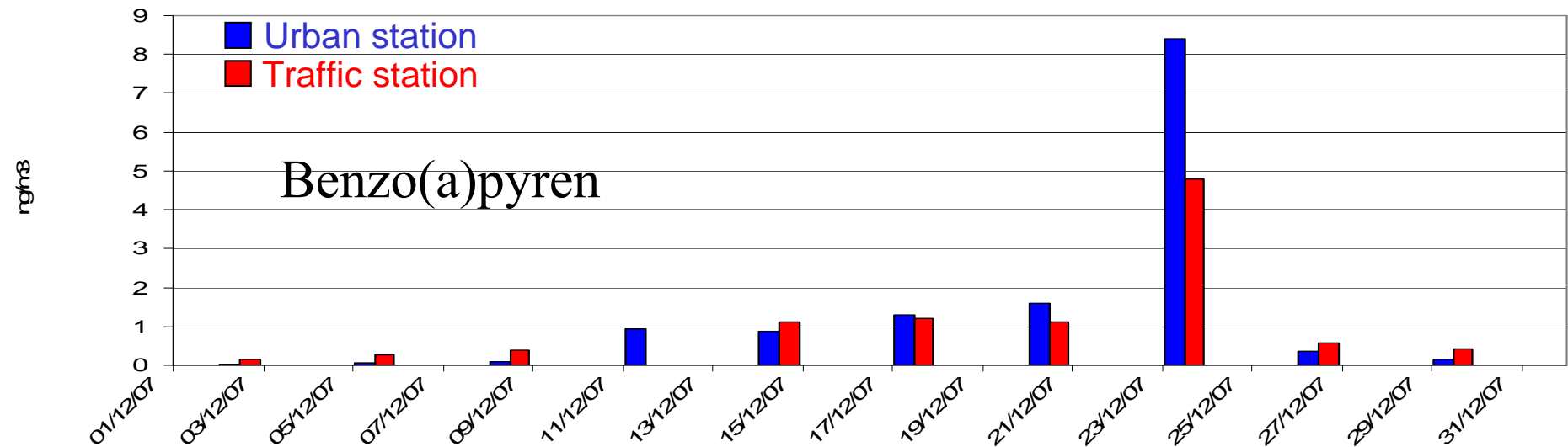
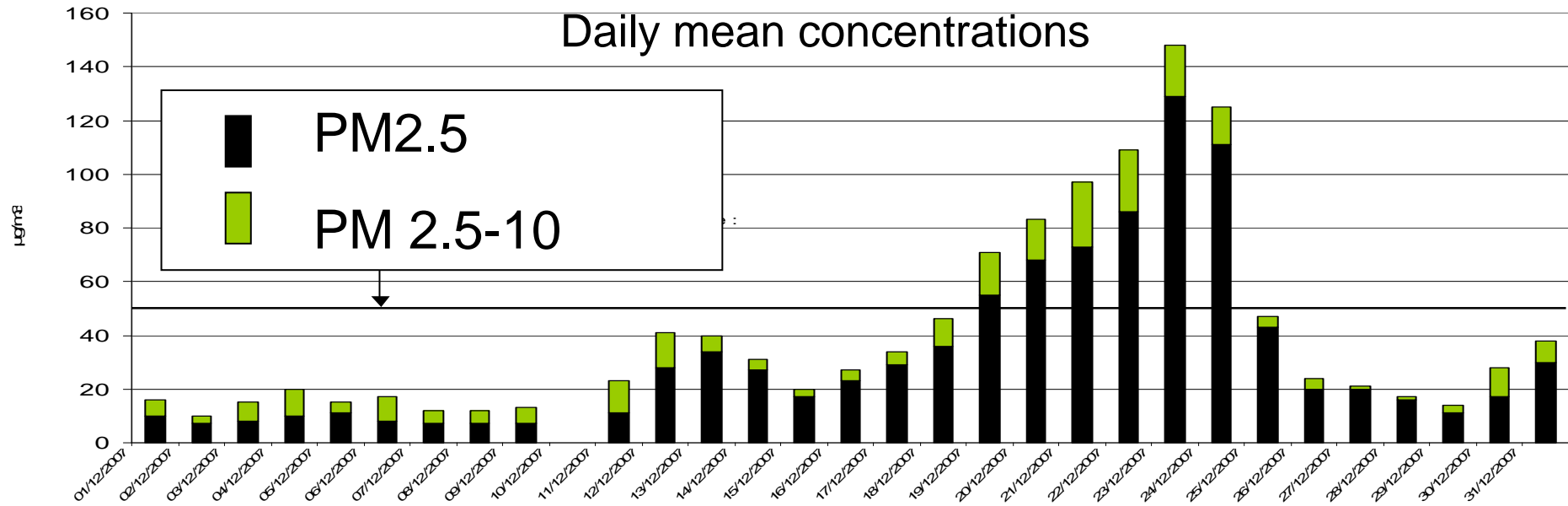
Daily mean PM10 concentrations

- TEOM Data
- FDMS – TEOM
(semi-volatile PM)



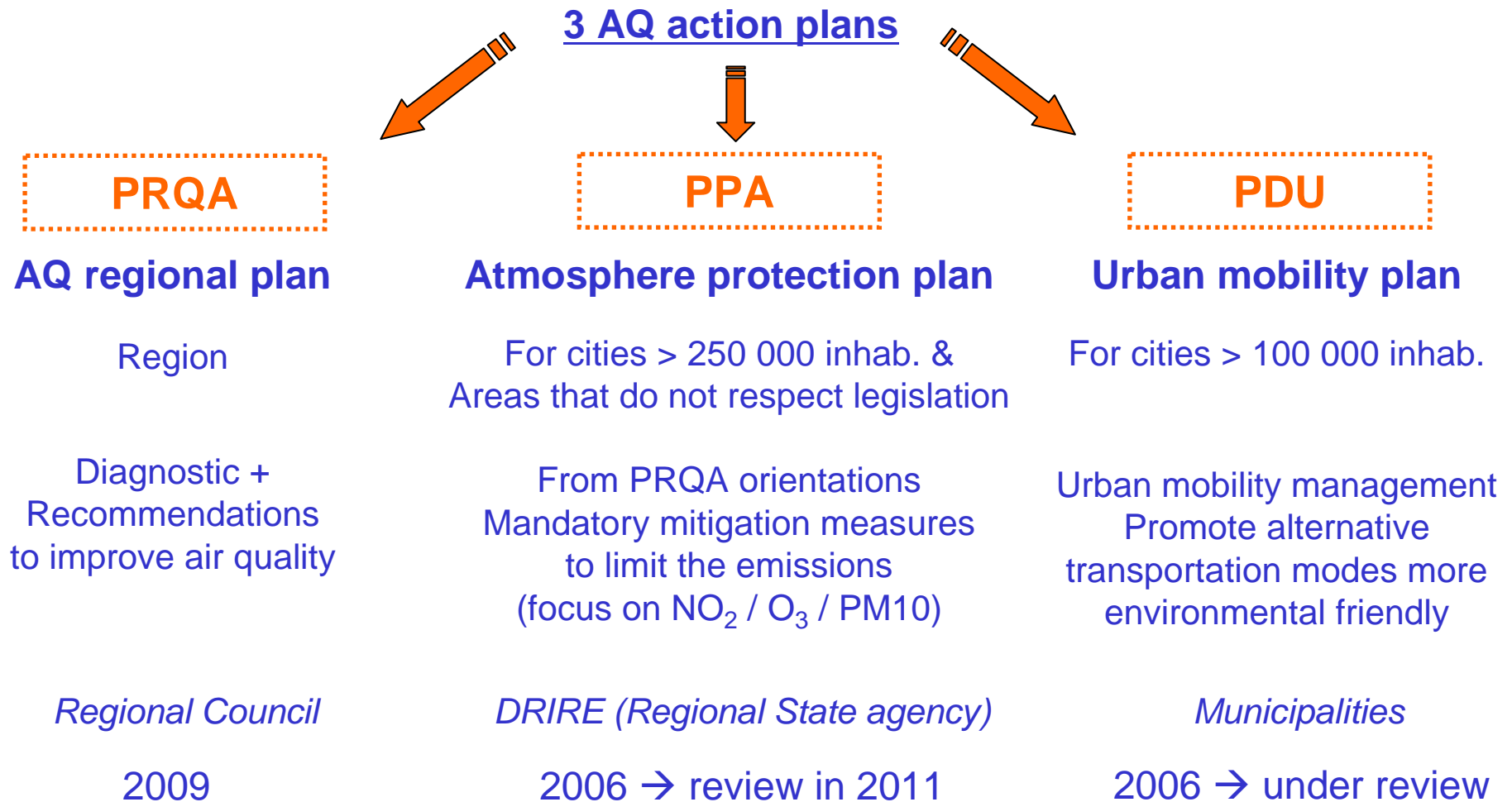
PM10 ; Episode of december 2007

Continental contribution and local sources (combustion)



The French air act - 30th December 1996

Everyone has the right to breath an air which is not harmful to health
 Implementation of the air quality monitoring networks and public information in France



Grenelle Act

Grenelle 1 (2009): overall objectives of the government's environmental programme

Grenelle 2 (2010): application text over 45 measures

SRCAE

Regional plan for
Climate, Air and Energy

Replace PRQA

Particles Plan

Objective :

Reduce PM2.5 emissions of
30% by 2015

Objective : **15 µg/m³ for PM2.5**

Target value since 2010

Limit value since 2015

ZAPA

Priority actions areas for Air

Experimental areas
to test mitigation measures
for the reduction of
PM and NOx emissions

Test over 3 years
(Municipalities)

Paris Action plans : **PDP** (Paris Travel Plan, 2006) ; **PLU** (Local Plan for Urbanism, 2006) ;
“Grand Paris” Project (2010)

Traffic change in Paris between 2002 and 2007



Traffic change in Paris due to modifications of the road network (traffic restriction, separated bus lanes, tram ...):

- Cars : - 15%
- Powered 2 Wheels : + 25%
- Buses (public transports): + 10%
- LDV : + 25%
- HDV : - 11%
- Buses (tourism) : - 11%

Source of the data: traffic department (Direction de la Voirie)- Municipality of Paris

Improve the knowledge of airborne particles sources in IdF and provide information to local authorities to build action plans in order to reduce PM levels and so public exposure :

1/ assessment of the respective proportions of particules due to sources located outside the region and those produced and formed locally (local action plans)

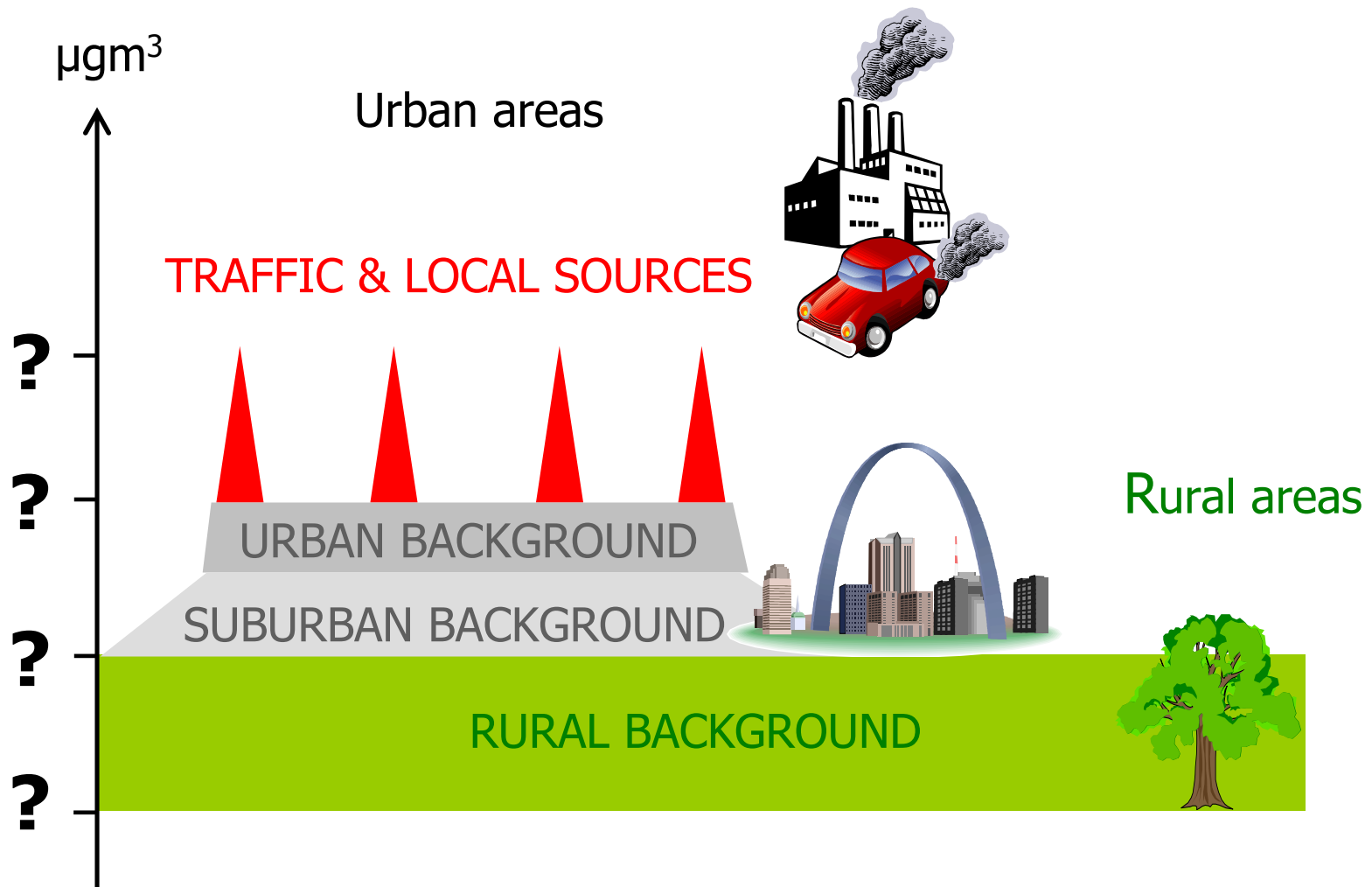
2/ assessment of the contribution of the main sectors to PM levels at these different scales

Study built on the example of Berlin :

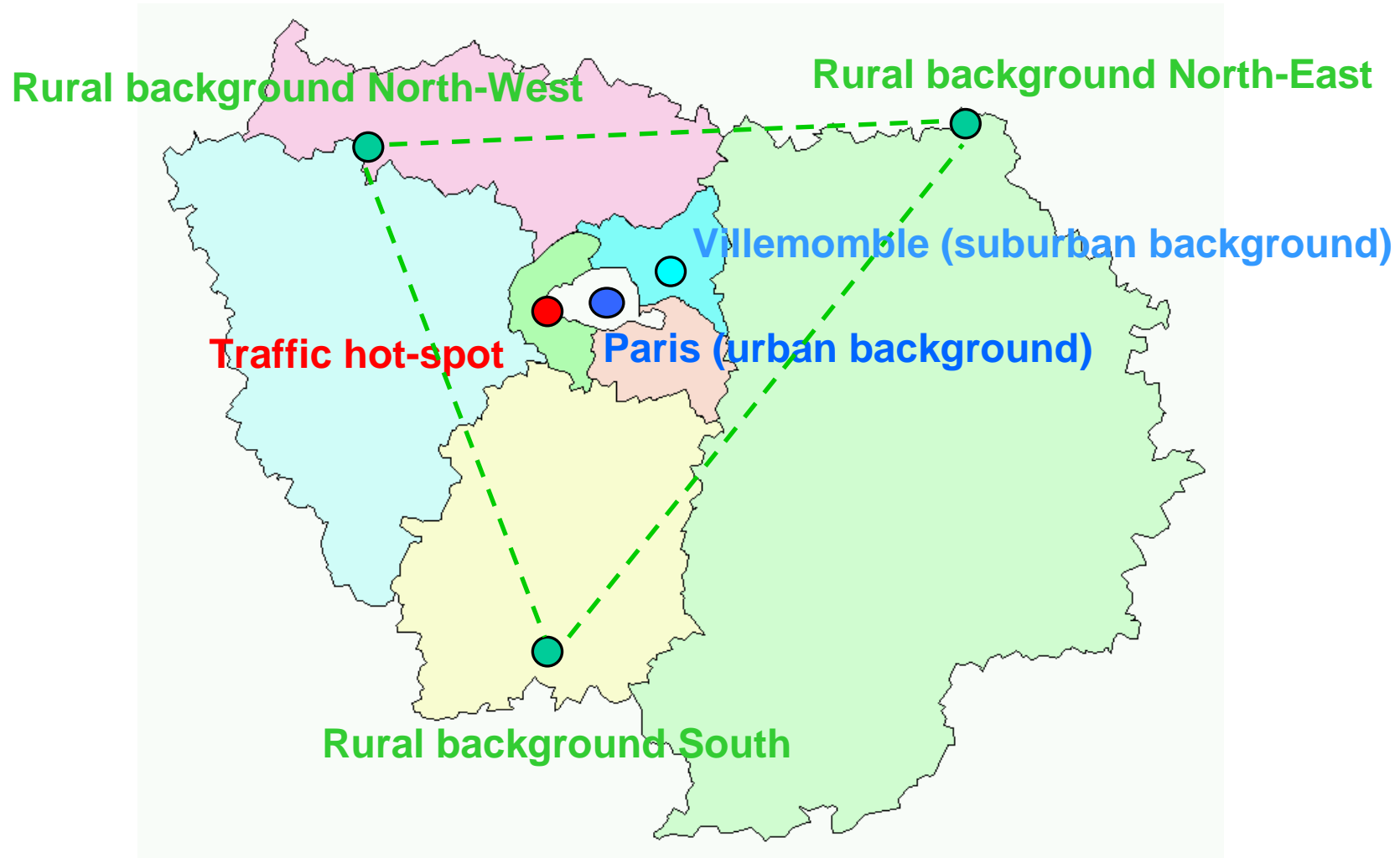
Lenshow approach, developped in Berlin in 2001



Based on the assumption that :
atmospheric PM concentrations = addition of geographical contributions



on different sites representative of
local traffic, urban & regional background levels



Monitoring of PM main chemical components

24-hours sampling every day during one year (September 2009 → 2010)

+ 2 stations $PM_{2.5}$ & PM_{10}
+ 4 stations $PM_{2.5}$

Chemical Analysis - LSCE

QMA filters : EC, OC, BC, WSOC

PTFE filters : PM, IONS, METALS (Al, Ca, Ti, V, Cr, Fe, Mn, Ni, Cu, Zn, Cd, Pb, As), SUGARS (Levoglucosan)

1- Day by day analysis according to meteorological conditions

[Rural]

representative for **outside contribution**

[Urban] - [Rural]

representative for **city centre contribution**

[Traffic] - [Urban]

representative for **local traffic contribution**

2- Average **on winter / summer** months and the whole year

3- Source apportionment : **coupling with emissions inventories and PMF**

Results expected in June 2011

Thank you for your attention !

www.airparif.asso.fr