AIR QUALITY IN PARIS REGION
2009

Summary

March 2010

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This report is an English summary of the annual report on ambient air quality in Paris region. It gives an overview of the concentrations for the European Union regulated pollutants during year 2009.

The complete report in French can be downloaded at
http://www.airparif.asso.fr/airparif/pdf/bilan_2009_2edition.pdf

Air quality complete data in Paris region can be found at AIRPARIF website
http://www.airparif.asso.fr/pages/resultats/histostats

Annual pollution maps are available at *http://www.airparif.asso.fr/pages/resultats/cartes*

Cover illustration : road traffic monitoring site located on the Main Road n°6 at Melun (photo AIRPARIF)

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Significant facts from 2009

After 2008, a remarkably low year considering very favourable meteorological conditions, 2009 represented a more normal year, confirming a certain number of trends. In comparison to 2008, 2009 therefore showed stability in the levels of chronic pollution, and even a significant increase in certain pollutants such as particles and, to a lesser extent, nitrogen dioxide.

➧2009 showed overall stability in the levels of nitrogen dioxide (NO_2) in Paris and its suburbs, both in background levels and close to road traffic, with slight isolated rises linked to less favourable weather in 2009. **The limit value was exceeded at the centre of the conurbation, at background away from traffic** (*Figure 1, Figure 2* & *Figure 3*).
Levels were generally stable close to traffic. They were on average two times higher than the annual limit value. **The limit value was therefore greatly exceeded across a significant portion of the Paris region road network, as almost 2000 km of roads were involved** (*Figure 4*). Although certain sites saw their levels stabilise, others, in contrast, continued to increase, as was the case, for example, along the Boulevard Périphérique (Parisian ring road).
In total, almost 3 million inhabitants of the Paris region (in the centre of the conurbation) were potentially exposed to more than the NO_2 annual limit value in 2009 (*Figure 5*).

It appears that the decline in the background levels of nitrogen dioxide is being increasingly reduced in the conurbation (*Figure 6* & *Figure 7*). **The growing demand for low-pollution vehicles is certainly an advantageous factor. But emission standards are based on NO_x and not on NO_2. One of the major factors in the increase of nitrogen dioxide levels, in both background levels and near to road traffic, is probably linked to primary NO_2 emissions from diesel vehicles. Catalysed particulate filters, which now equip the vast majority of new diesel vehicles, contribute to a noticeable increase in NO_2 emissions. It is now confirmed that the proportion of NO_2 in NO_x emissions is steadily increasing, as shown by observations made at stations close to Paris region traffic** (*Figure 8*). **Similar observations have been made for several years in other European conurbations such as London. This phenomenon could explain why the background NO_2 levels are no longer decreasing as in the past.**

➧While in 2008, PM10 and PM2.5 particles were at their lowest historical level, 2009 saw a significant increase in their concentrations.
Near to road traffic, the daily and annual limit values for PM10 particles were still widely exceeded (*Figure 9, Figure 10* &*Figure 11*). In 2009, in total **there were around 2.8 million inhabitants within the conurbation and close to major traffic roads that were potentially affected by the daily limit value for PM10 particles being exceeded** (*Figure 12*). This is more than in 2008 but less than in 2007.
For fine particles (PM2.5), **all 11.7 million inhabitants of the Paris region were potentially affected in 2009 by the exceeding of the target value recommended by the 2nd National Environmental Health Action Plan** (value applicable from 2010) **and by the first act of the "Grenelle Environnement" of August 2009** (*Figure 13* & *Figure 14*).

➧ **With regards to ozone, the air quality objective for this pollutant was exceeded, as it is every year, across the entire Paris region, particularly in the suburban and rural areas** (*Figure 15* & *Figure 16*). Meteorologically-speaking, the summer of 2009 was generally favourable for air quality, with the beginning of the summer season being particularly cloudy. Only August saw clear hot days leading to a significant rise in ozone levels.

➧ **Benzene levels have been generally stable for several years, following a long period of decline beginning at the end of the 1990s** (*Figure 17* & *Figure 18*). Although at a background level, the quality objective was met, this was not the case close to road traffic where this national objective was exceeded along more than 700 km of regional roads (*Figure 19*). **Generally-speaking, there are almost 1 million inhabitants of the Paris region, situated in the conurbation and close to road**

traffic that were potentially affected by the annual quality objective for benzene being exceeded (*Figure 20* & *Figure 21*).

➧ As previous years, air quality standards were largely met for the following European union regulated pollutants : **sulphur dioxide SO_2** (*Figure 22* & *Figure 23*), **carbon monoxide CO** (*Figure 24* & *Figure 25*), **benzo(a)pyrene** (*Figure 26* & *Figure 27*), **lead** (*Figure 28*), **arsenic** (*Figure 29*), **cadmium** (*Figure 30*) and **nickel** (*Figure 31*).

➧ From the point of view of pollution episodes, **the information and warning system was activated on 12 days in 2009**, unlike in 2008. It affected the summer period (2 days for ozone) but primarily other times of the year. The PM10 particle level was exceeded on eight days including one warning, and nitrogen dioxide levels were exceeded on two days. These episodes of pollution were observed when conditions were unfavourable for continuous dispersion of the pollutants, primarily during the winter season.

	Trend 2000-2009		**Standards to be met** Limit value		**Non-binding standards** Quality objective		Target value	
	Away from traffic	Close to traffic	Away from traffic	Close to traffic	Away from traffic	Close to traffic	Away from traffic	Close to traffic
PM10	→	→	Exceeded	Exceeded	Met	Exceeded		
PM2.5	→	→					Exceeded	Exceeded
NO_2	↘	→	Exceeded	Exceeded	Exceeded	Exceeded		
O_3	↗				Exceeded		Met	
Benzene	↘	↘	Met	Met	Met	Exceeded		

Figures

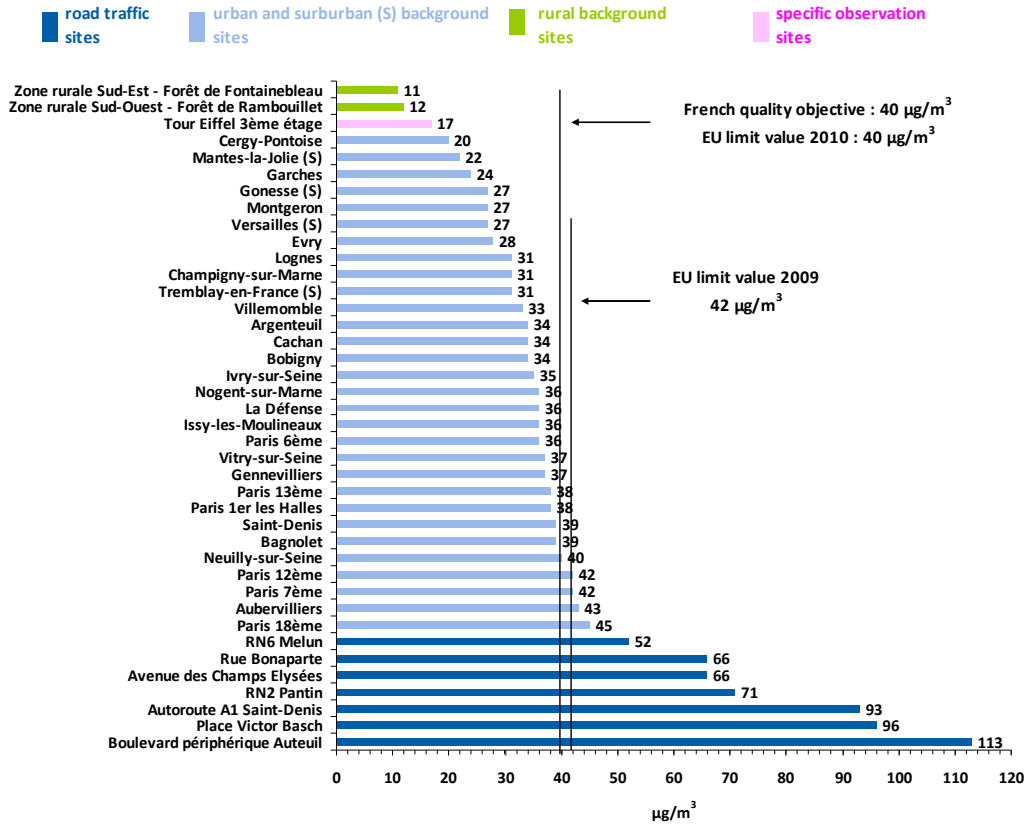

Figure 1 : nitrogen dioxide (NO_2) annual mean concentration for all continuous monitoring sites in Paris region in 2009

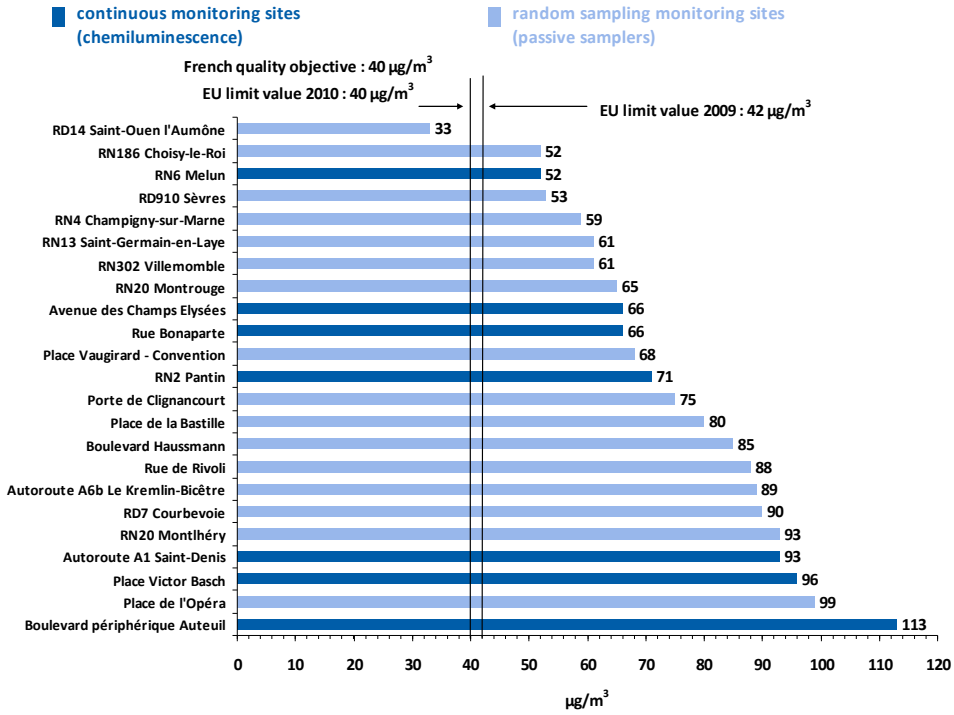

Figure 2 : nitrogen dioxide (NO_2) annual mean concentration for all road traffic monitoring sites in Paris region in 2009

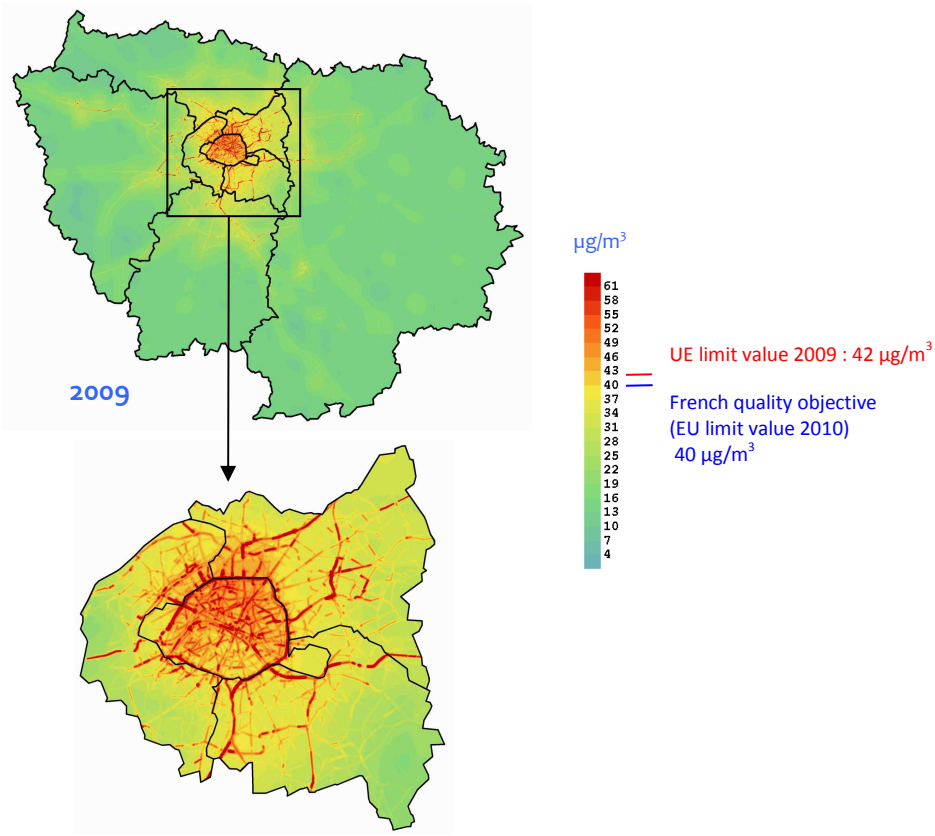

Figure 3 : nitrogen dioxide (NO_2) annual mean concentration in Paris region, background and close to road traffic, focus on Paris et near suburbs, 2009

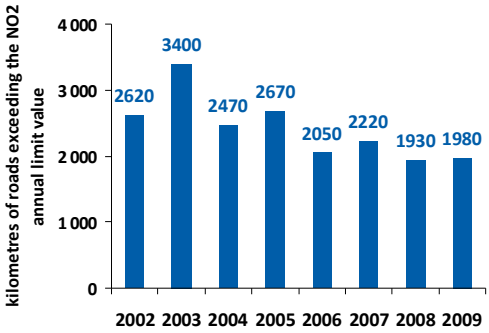

Figure 4 : kilometres of main road network exceeding the nitrogen dioxide (NO_2) EU annual limit value in Paris region, 2002 to 2009

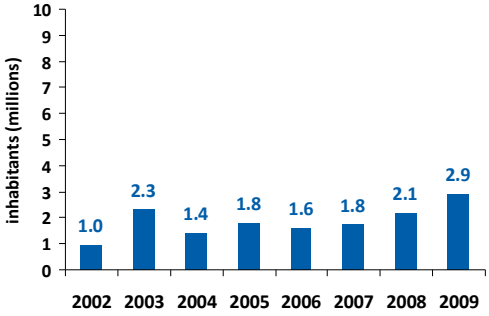

Figure 5 : millions of inhabitants potentially exposed to an exceeding of the nitrogen dioxide (NO_2) EU annual limit value in Paris region, 2002 to 2009

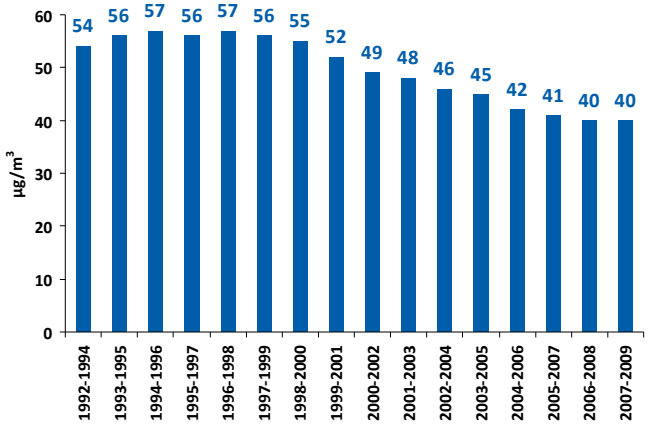

Figure 6 : trend in the nitrogen dioxide (NO_2) tri-annual mean concentration, unchanging sample of six urban background sites in Paris conurbation, 1992-1994 to 2007- 2009

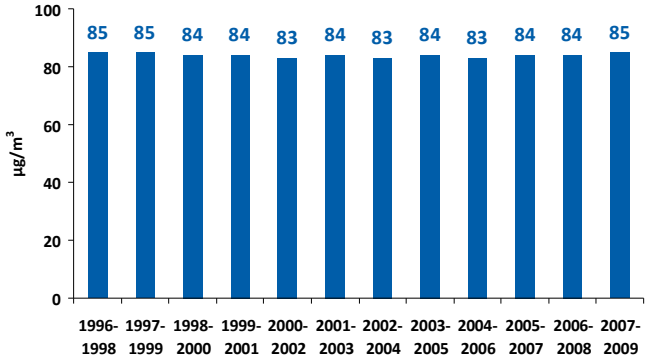

Figure 7 : trend in the nitrogen dioxide (NO_2) tri-annual mean concentration, unchanging sample of five road traffic sites in Paris conurbation, 1996-1998 to 2007- 2009

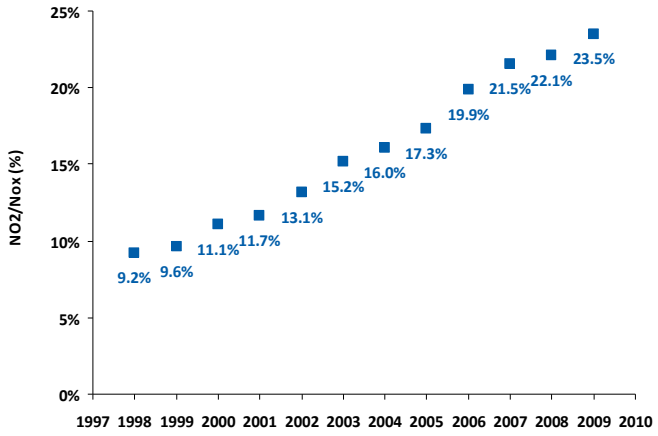

Figure 8 : trend in ratio [NO2]/[NOx], mean calculated on the road traffic sites in Paris conurbation (background level subtracted), 1998 to 2009

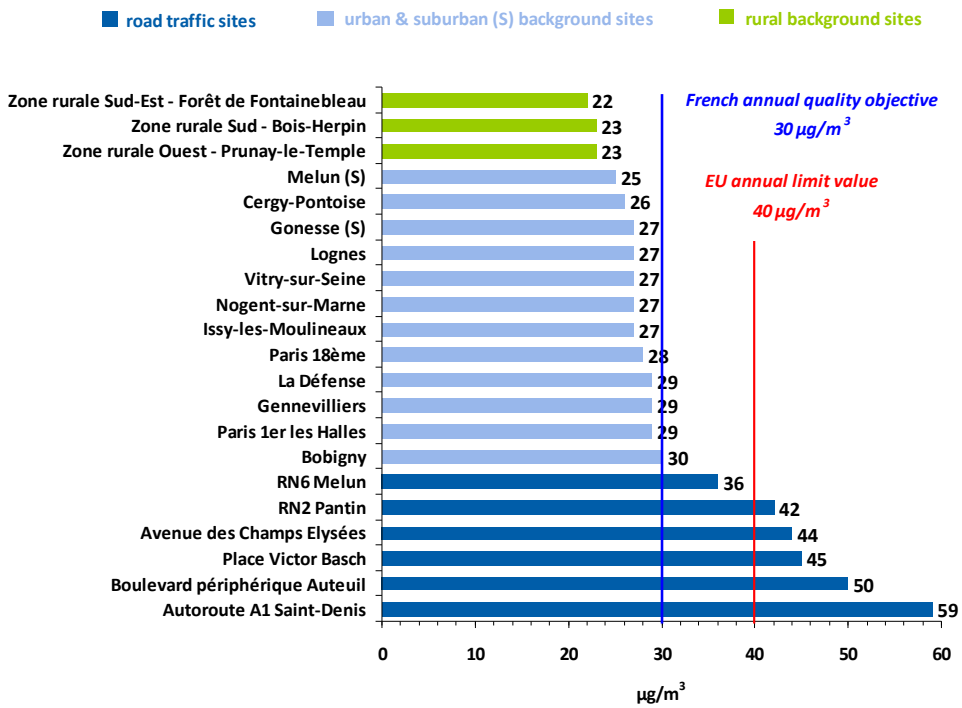

Figure 9 : PM10 annual mean concentration for all continuous monitoring sites (TEOM FDMS) in Paris region in 2009

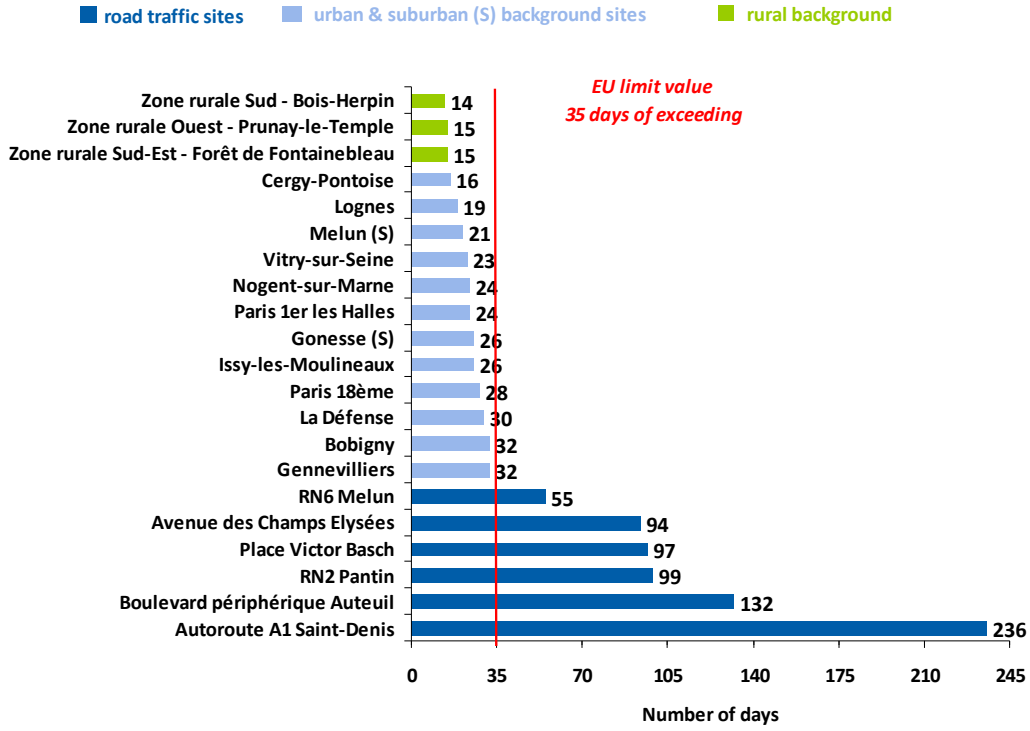

Figure 10 : PM10 annual number of days exceeding the 50cµg/m³ EU threshold for all continuous monitoring sites (TEOM FDMS) in Paris region in 2009

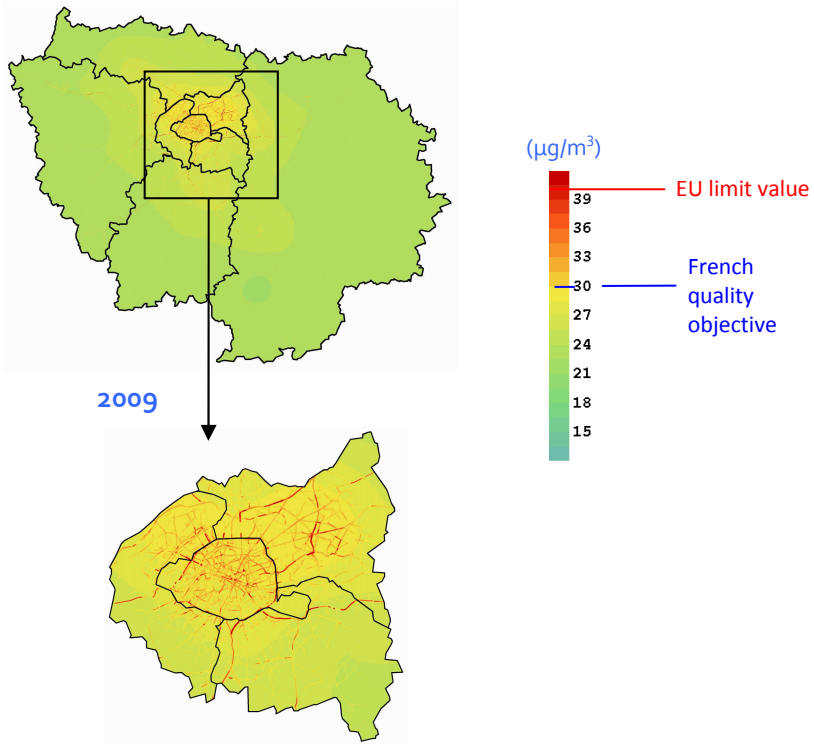

Figure 11 : PM10 annual mean concentration in Paris region, background and close to road traffic, focus on Paris et near suburbs, 2009

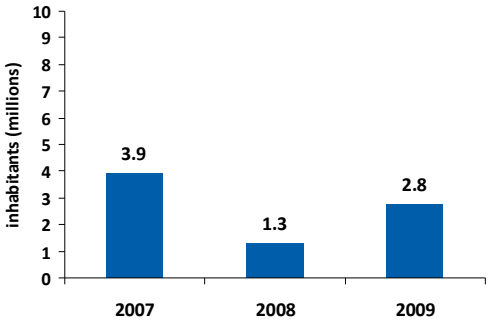

Figure 12 : millions of inhabitants potentially exposed to an exceeding of the PM10 EU daily limit value in Paris region, 2007 to 2009

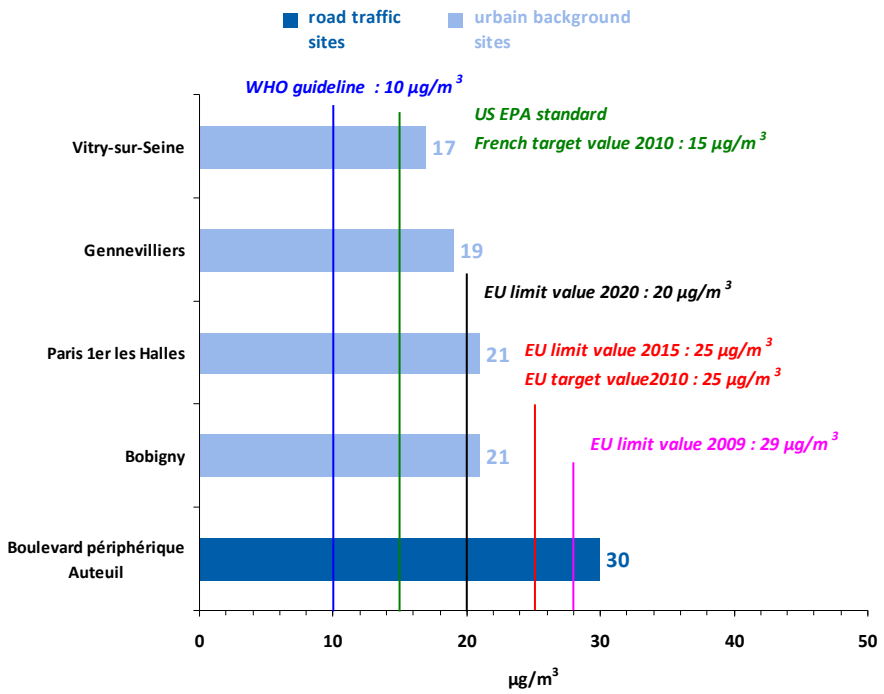

Figure 13 : PM2,5 annual mean concentration for all continuous monitoring sites (TEOM FDMS) in Paris region in 2009

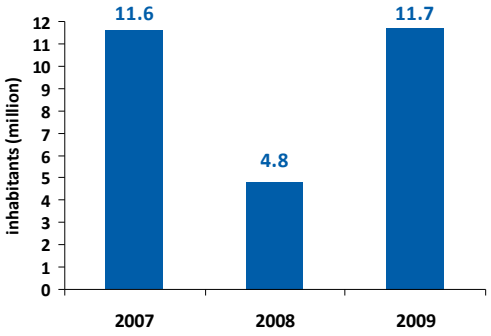

Figure 14 : million of inhabitants potentially exposed to an exceeding of the PM2,5 French target value in Paris region, 2007 to 2009

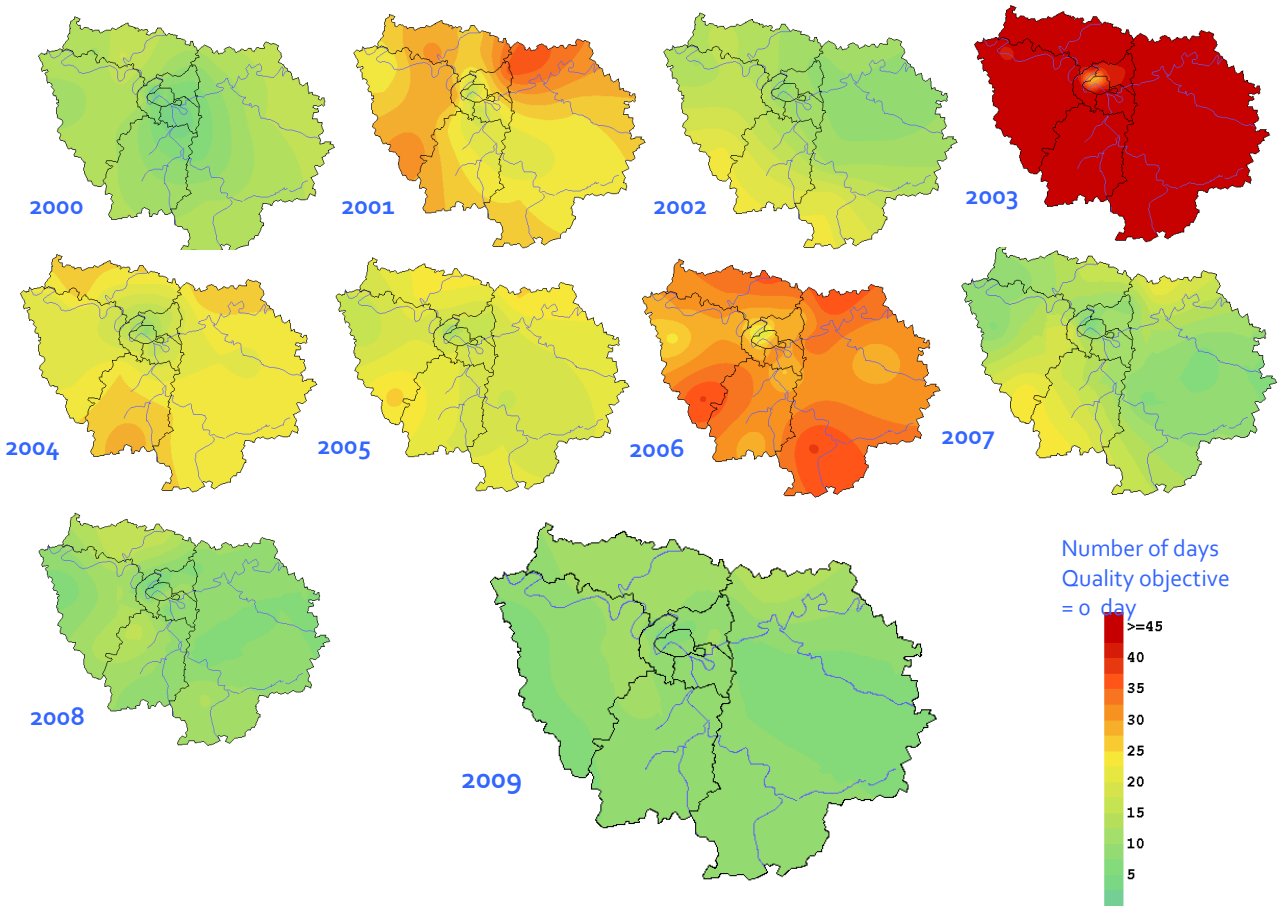

Figure 15 : number of days exceeding the French quality objective (=EU long-term objective), threshold 120 µg/m³ 8-hour mean, objective = no exceeding) for ozone (O_3) in Paris region, 2000 to 2009

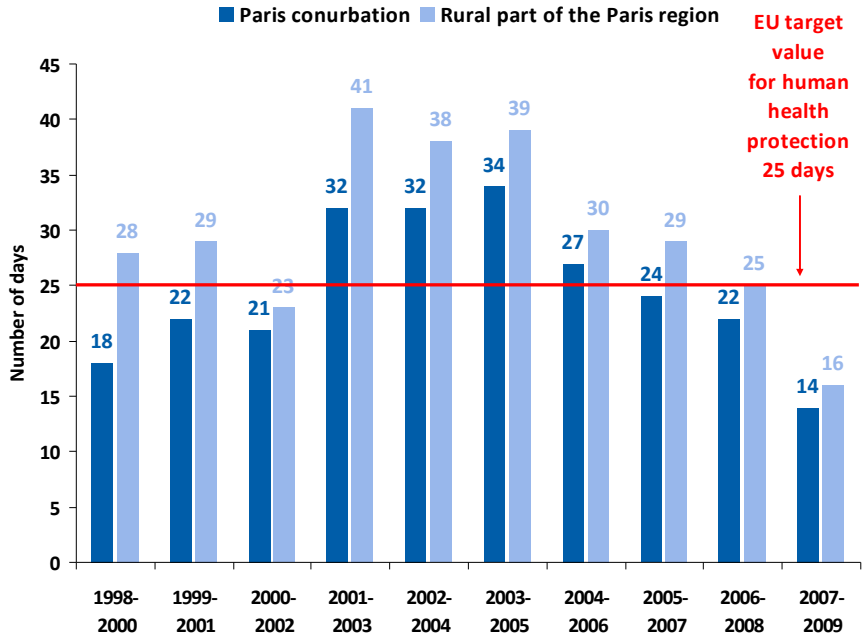

Figure 16 : number of days exceeding the threshold of the EU target value for protection of human health (120 µg/m³ 8-hour average, not over 25 days of exceeding on a 3 years period) in Paris region, for the highest monitoring site in urban and rural parts of the region, 1998-2000 to 2007-2009

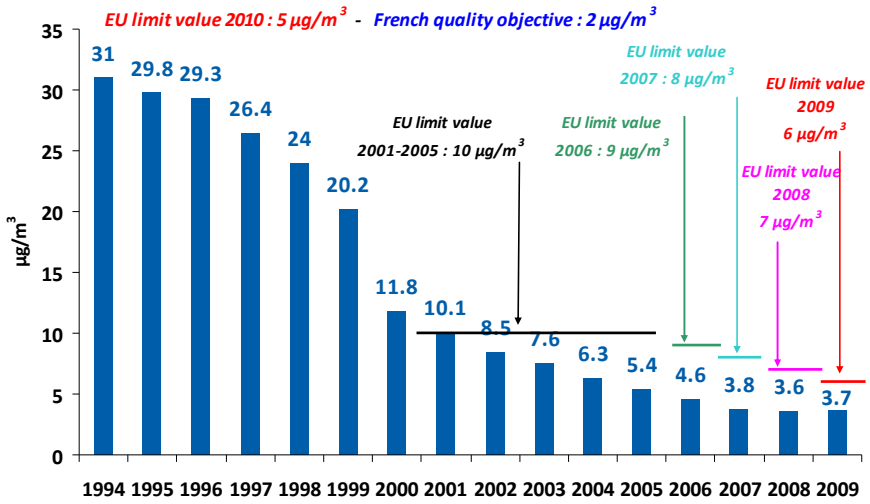

Figure 17 : trend in the benzene annual mean concentration on Place Victor Basch Paris road traffic monitoring site, 1994 to 2009

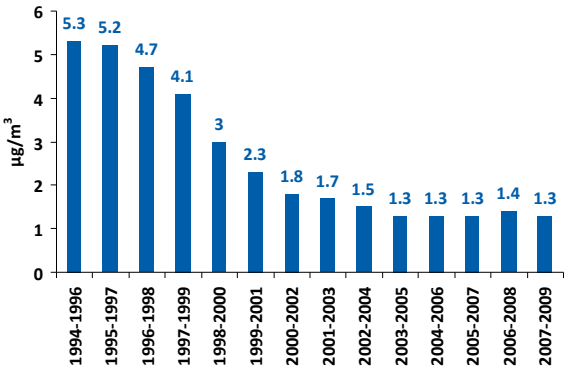

Figure 18 : trend in the benzene tri-annual mean concentration, changing sample of five to ten urban background sites in Paris conurbation, 1994-1996 to 2007- 2009

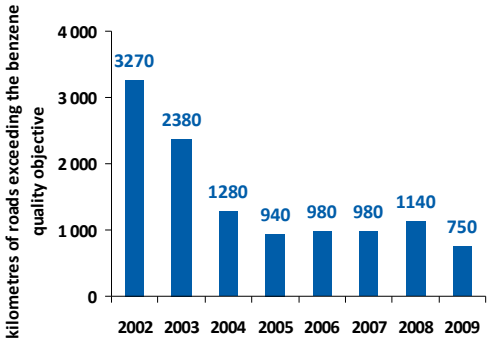

Figure 19 : kilometres of main road network exceeding the benzene French quality objective (2 µg/m³) in Paris region, 2002 to 2009

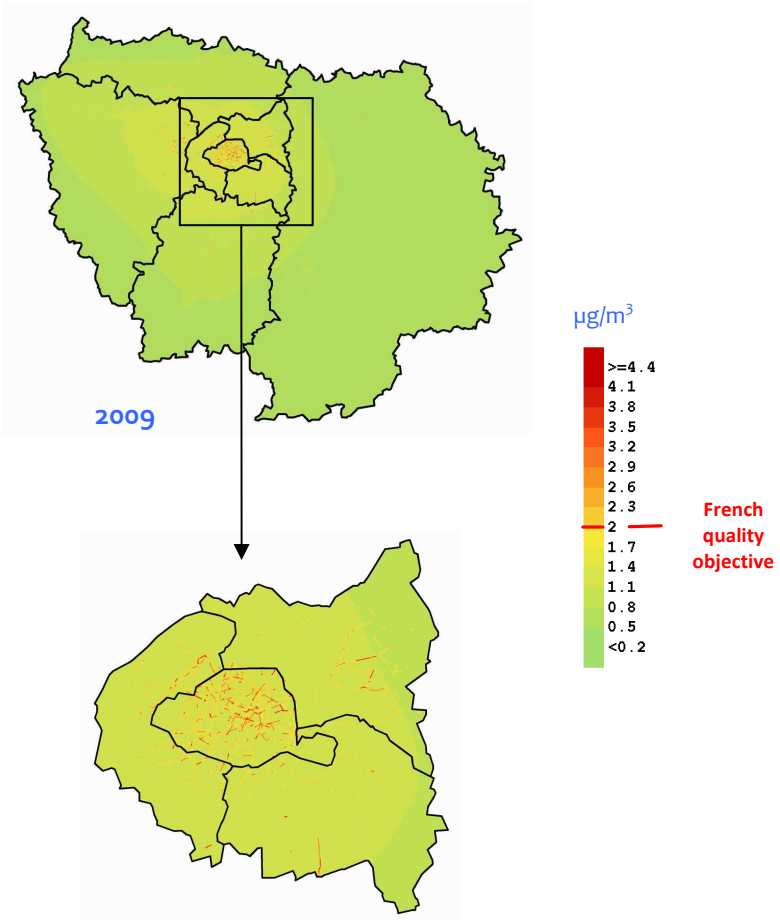

Figure 20 : benzene annual mean concentration in Paris region, background and close to road traffic, focus on Paris et near suburbs, 2009

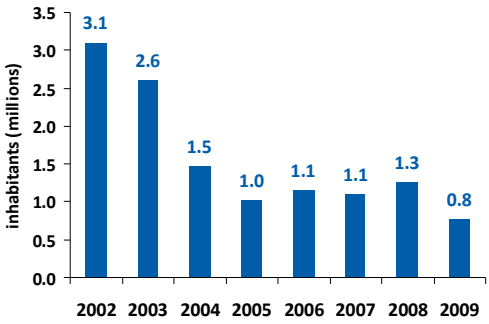

Figure 21 : millions of inhabitants potentially exposed to an exceeding of the benzene French quality objective (2 µg/m³) in Paris region, 2002 to 2009

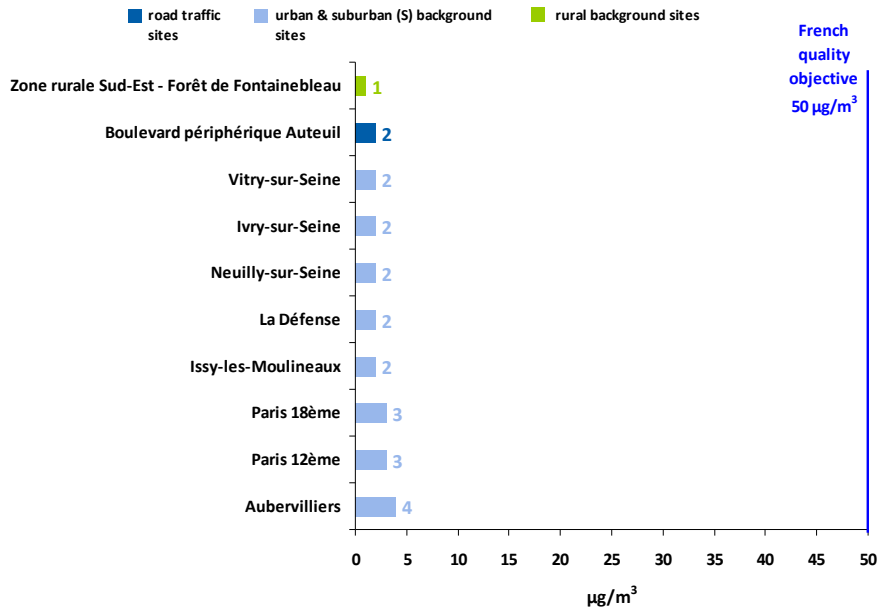

Figure 22 : sulphur dioxide (SO_2) annual mean concentration for all continuous monitoring sites in Paris region in 2009

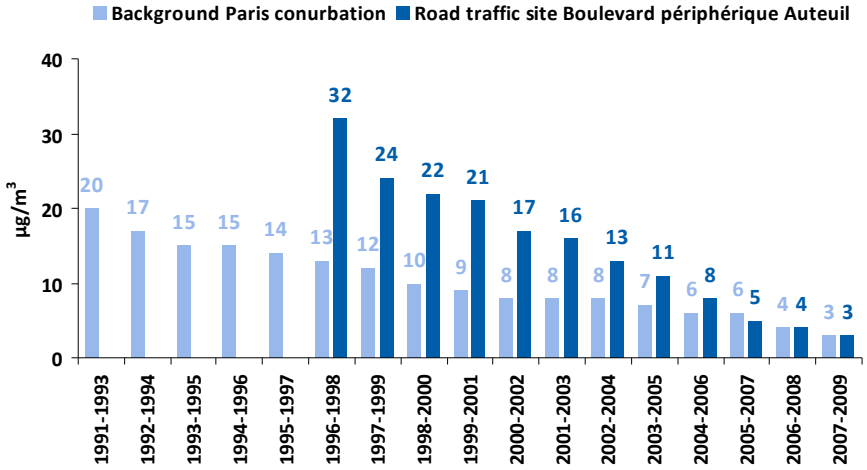

Figure 23 : trend in the sulphur dioxide (SO_2) tri-annual mean concentration, changing sample of urban background sites in Paris conurbation and road traffic site on Parisian ring road, 1991-1993 to 2007- 2009

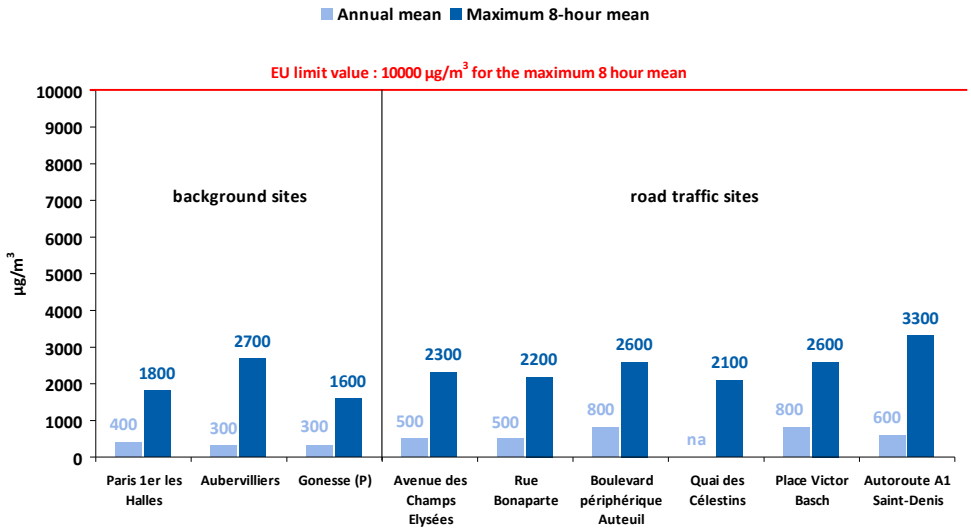

Figure 24 : carbon monoxide (CO) annual mean and annual maximum 8-hour mean concentration for all continuous monitoring sites in Paris region in 2009

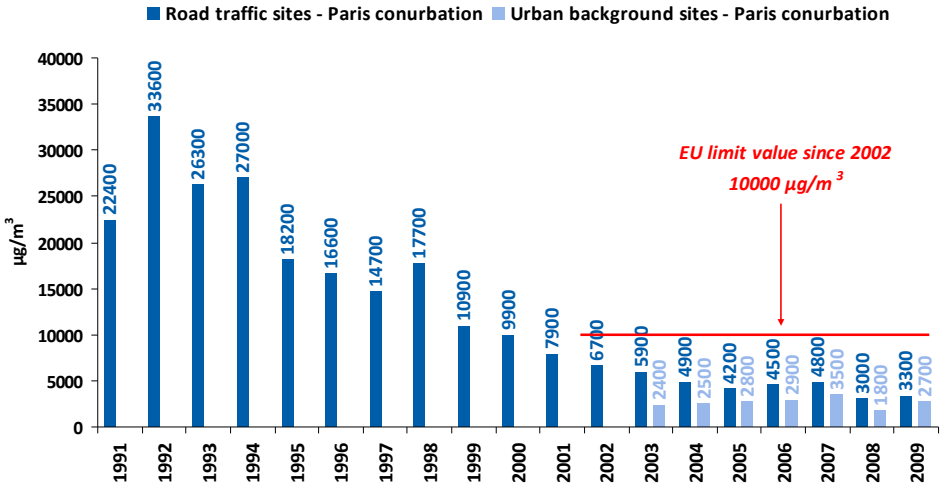

Figure 25 : trend in the carbon monoxide (CO) annual maximum 8-hour mean concentration, urban background sites and road traffic sites in Paris conurbation, 1991 to 2009

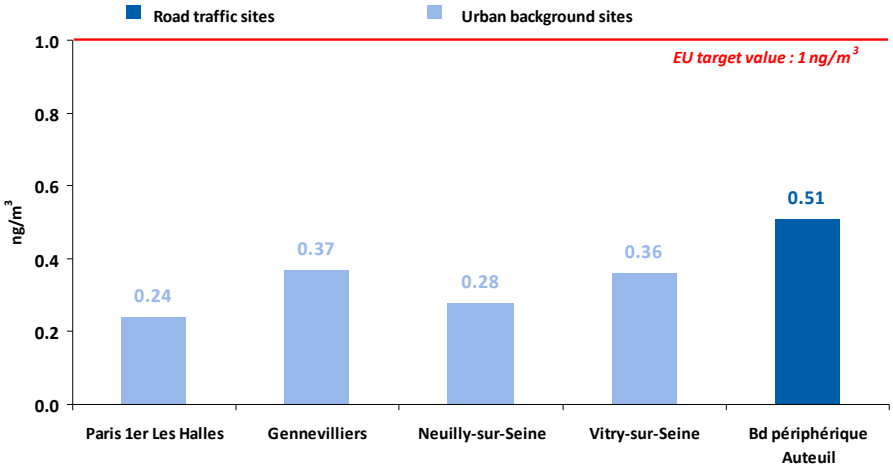

Figure 26 : benzo(a)pyrene annual mean concentration for all monitoring sites in Paris region in 2009

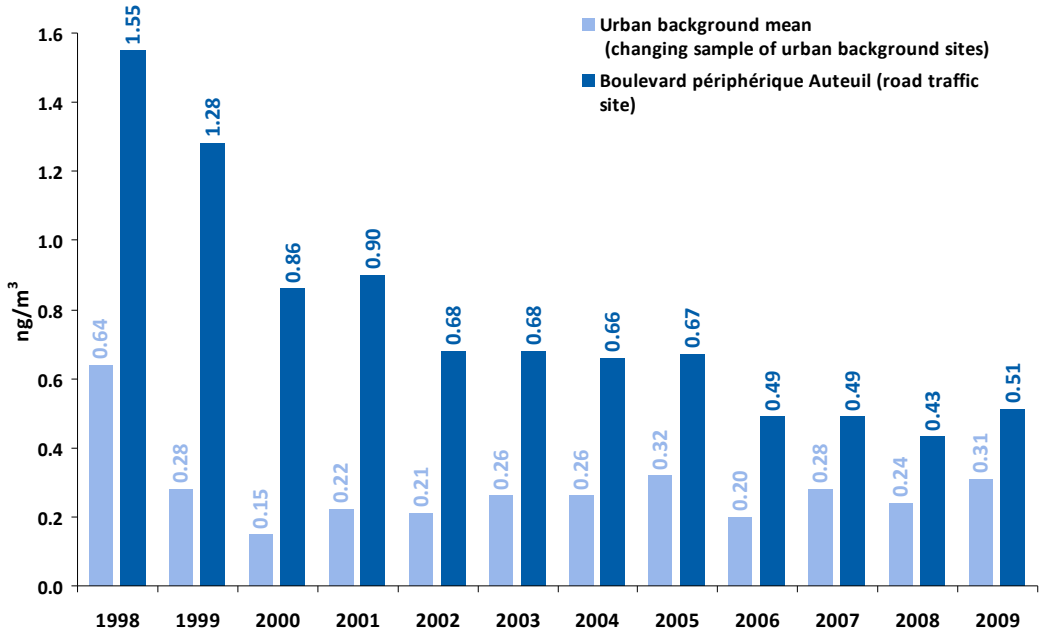

Figure 27 : trend in the benzo(a)pyrene annual mean concentration, urban background sites mean and road traffic site in Paris conurbation, 1998 to 2009

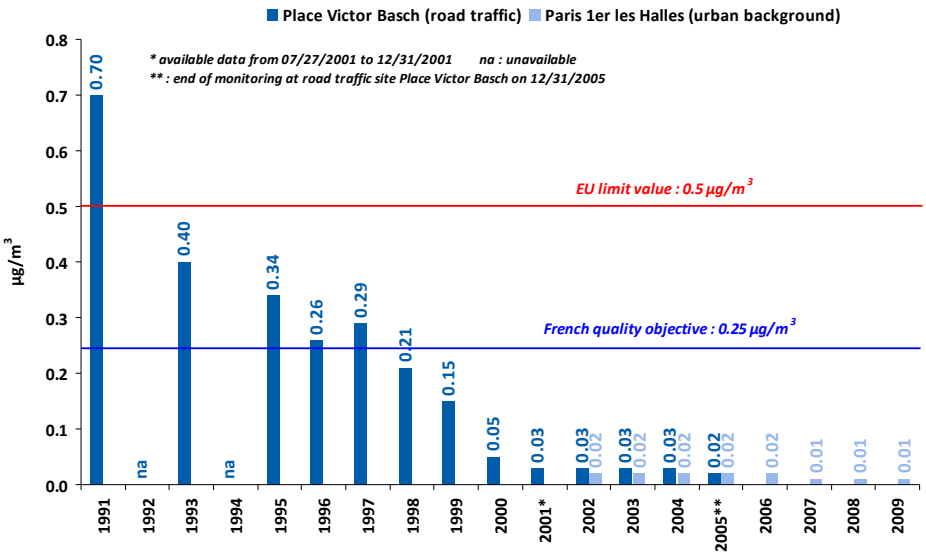

Figure 28 : trends in the lead annual mean concentration, urban background and road traffic sites in Paris, 1991 to 2009

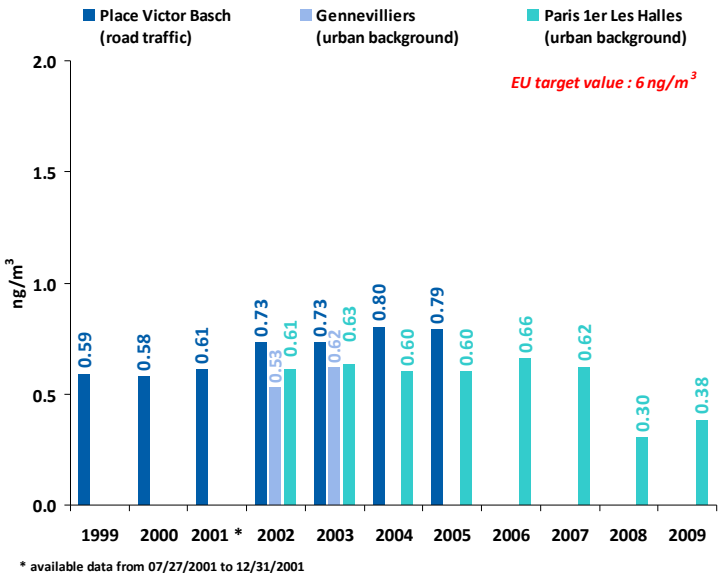

Figure 29 : trends in the arsenic annual mean concentration, urban background and road traffic sites in Paris, 1999 to 2009

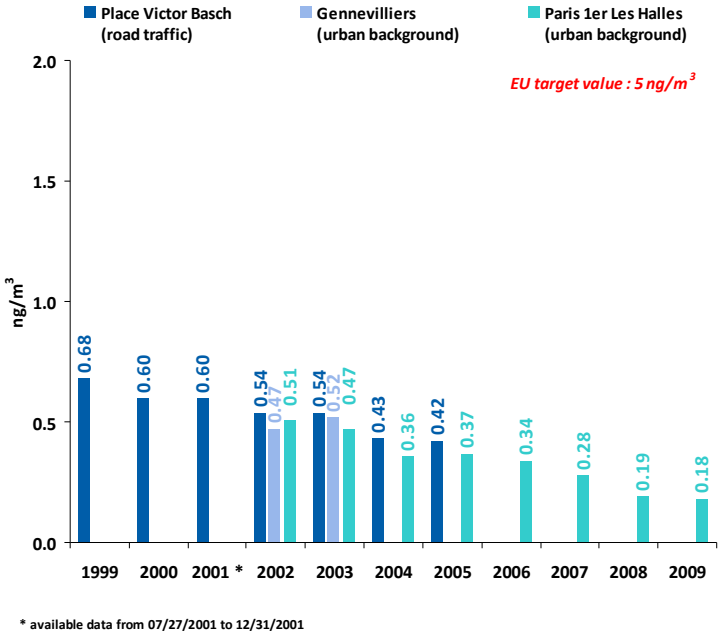

Figure 30 : trends in the cadmium annual mean concentration, urban background and road traffic sites in Paris, 1999 to 2009

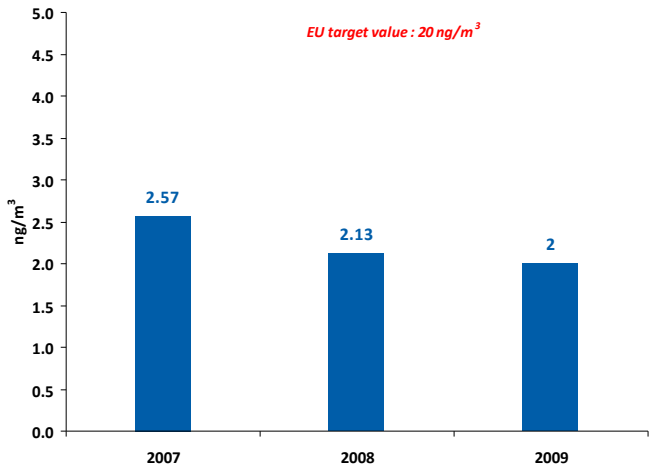

Figure 31 : nickel annual mean concentration, urban background site in Paris, 2007 to 2009