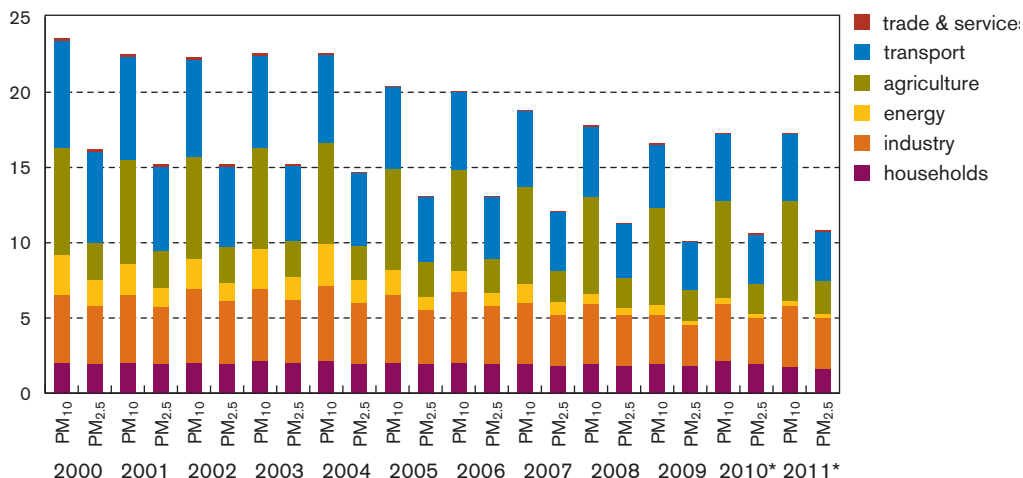


😊 Emission of particles

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emissions (ktonnes)



* provisional figures

emissions from road traffic for 2010 not comparable with 2000-2009 series due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010

Source: VMM

Agriculture, transport and industry are the main sources of particulate matter emissions

The inhalation of increased concentrations of particulate matter (PM₁₀ and PM_{2.5}) is harmful to health. Primary particles are emitted directly into the air from a variety of sources (e.g. vehicle exhausts). In addition, secondary particulate matter can be formed by the chemical reactions of precursor substances. Agriculture remains the main source for both PM₁₀ and PM_{2.5}. Transport and industry come in second and third.

The MINA plan 4 (2011-2015) includes only emission targets for PM_{2.5}. These targets apply for transport emissions (transport sector plus off-road and fisheries), with maximum 2.3 ktonnes by 2015, and for stationary sources, with 6.0 ktonnes by 2015. Provisional results indicate that the emissions are still well above the MINA plan targets. Following the review of the Göteborg Protocol in May 2012, the NEC targets will probably be expanded with targets for particulate matter. This may take place in 2013.

First emission figures for elemental carbon

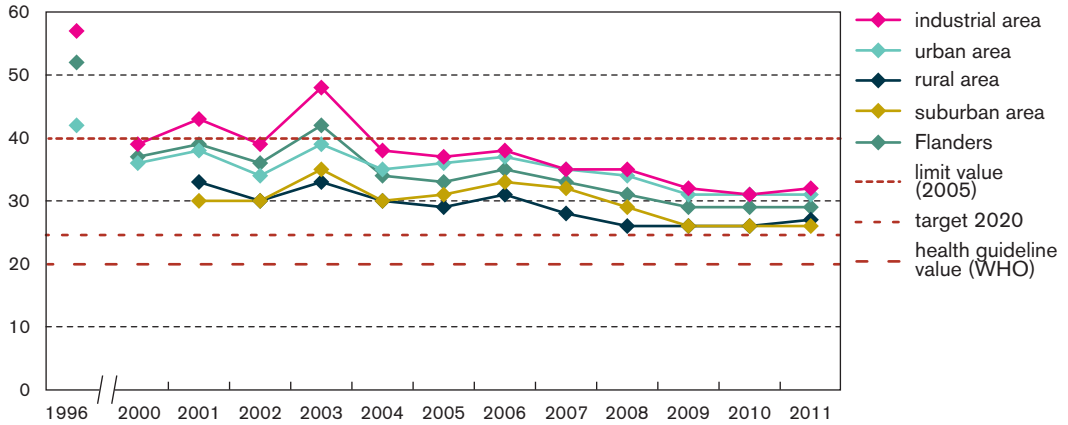
The emissions of elemental carbon have been determined for the first time. Elemental carbon (EC) is a fraction of the particulate matter that is specifically formed during incomplete combustion reactions. The compilation of this emission inventory follows the international trend of paying increasing attention to the composition of particulate matter. The chemical composition has in fact an impact on the resulting effects on health of particulate matter. Since 1995, the emissions of elemental carbon have almost halved. This decrease is mainly attributable to a decrease in the transport emissions. However, these emissions still account for about half of all EC emissions. Agriculture emissions, which include, among others, emissions from agricultural vehicles and heating of e.g. greenhouses and animal stalls, represented 20 % of the EC emissions in 2009.

EC emissions (tonnes)	1995	2000	2005	2007	2008	2009	2010*	2011*
households	445	438	436	403	415	411	451	363
industry	654	422	427	445	494	407	439	460
energy	189	147	84	75	28	29	18	11
agriculture	681	713	655	620	605	622	606	611
transport	4 054	3 073	2 241	1 975	1 778	1 577	1 598	1 596
trade & services	46	48	35	35	28	28	27	21

Annual average PM₁₀ concentration



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annual average PM₁₀ concentration (µg/m³)

Source: VMM

Annual average PM₁₀ concentrations are stagnating

The annual average PM₁₀ concentration gives an illustration of the long-term exposure to particulate matter in the air. The inhalation of this particulate matter can have an effect on health. The sharp decrease recorded in the 1990s has not continued in recent years. The annual average PM₁₀ concentration has hardly changed in the period 2009-2011.

Limit value reached, targets still within reach

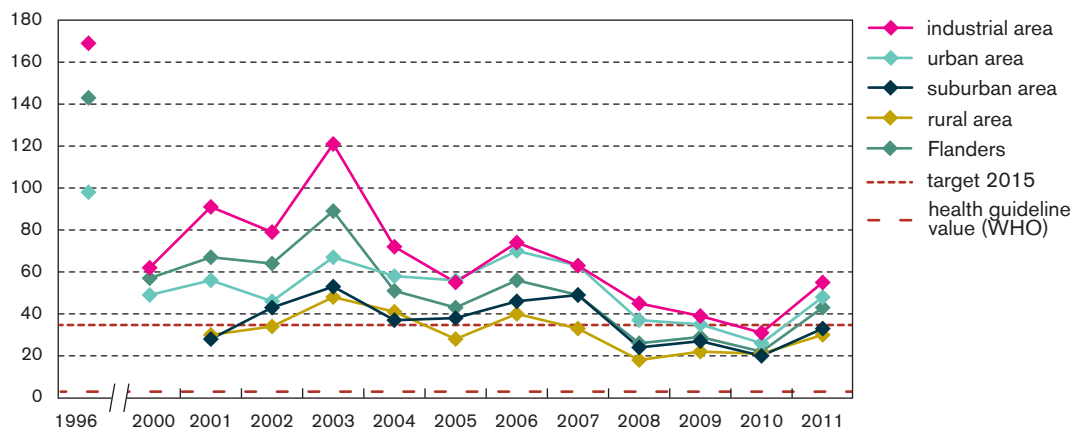
The limit value of 40 µg/m³ imposed by the European Air Quality Directive (2008/50/EC) has been met everywhere since 2008. The target for 2020 as stated in Pact 2020 and the MINA plan 4 (2011-2015) is a reduction of 25 % with respect to 2007. This corresponds to a maximum concentration of 24.8 µg/m³ in 2020. In 2011, the gap was reduced on average by half in Flanders (based on all measurement stations). This decrease occurred almost exclusively in 2007-2009, after which the annual average PM₁₀ concentration stagnated. For the type areas, only the averages of the suburban and rural areas come close to this target. The health guideline value of 20 µg/m³, as specified by the World Health Organization (WHO), is still far from being achieved.

PM ₁₀ concentration (µg/m ³)	2000	2007	2008	2009	2010	2011
industrial area	39	35	35	32	31	32
urban area	36	35	34	31	31	31
rural area	..	28	26	26	26	27
suburban area	..	32	29	26	26	26
<i>Flanders</i>	<i>37</i>	<i>33</i>	<i>31</i>	<i>29</i>	<i>29</i>	<i>29</i>



☹ Daily average PM₁₀ concentration

days >50 µg/m³ (number)



Source: VMM

Number of days >50 µg/m³ increasing again

The daily average PM₁₀ concentration plots the short-term exposure of the population as well as the peak concentrations of PM₁₀ in the ambient air. The peak concentrations are expressed in days with a daily average PM₁₀ concentration >50 µg/m³. This number of days has decreased slightly since 2006. In 2011, however, there was an increase in the number of days when it was exceeded, probably because the meteorological conditions were less favourable.

EU limit value not yet reached

Since 2005, the European Air Quality Directive (2008/50/EC) has imposed a limit value for PM₁₀ in ambient air of maximum 35 days with a daily average PM₁₀ concentration of more than 50 µg/m³. Because this daily limit value was not met, Belgium was referred to the European Court in April 2011. This limit value has been incorporated into the Pact 2020. In the MINA plan 4 (2011-2015), the same limit value is formulated differently as a target for 2015, namely the 'percentage of the population that is exposed for more than 35 days to concentrations of more than 50 µg/m³ is to drop to 0 %'. In 2011, it was not only exceeded at individual measurement stations (17 of the 35 stations), but also the averages for the urban and industrial type areas and the average for Flanders exceeded the limit value.

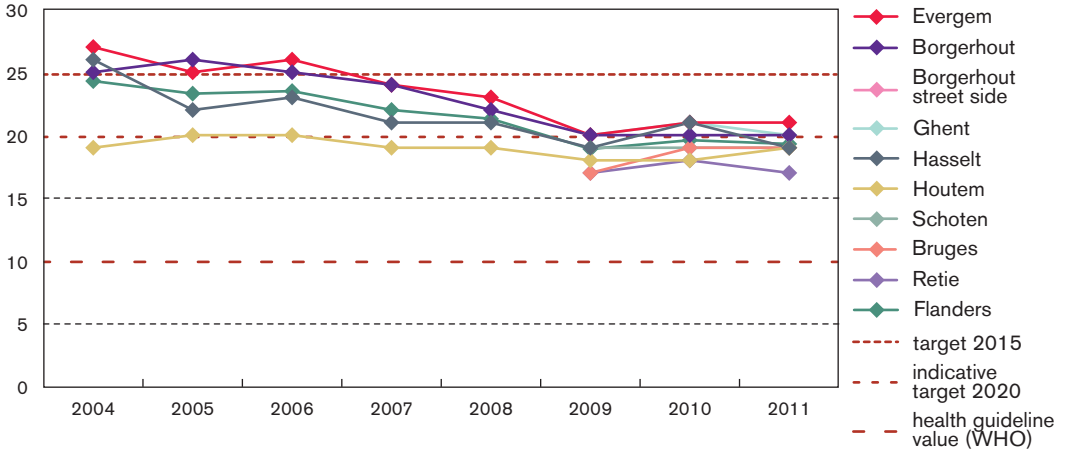
The World Health Organization (WHO) maintains that there is no safe threshold value for exposure to particulate matter, but it nevertheless specified a number of guideline values. For the daily average PM₁₀ concentration, this corresponds to a maximum of three days exceeded per year. Just as with the annual average PM₁₀ concentration, this guideline value is still well below the currently measured values.

days >50 µg/m ³ (number)	2007	2008	2009	2010	2011
industrial area	63	45	39	31	55
urban area	63	37	35	26	48
suburban area	49	24	27	20	33
rural area	33	18	22	21	30
Flanders	49	26	29	22	43

☺ Annual average PM_{2.5} concentration

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annual average PM_{2.5} concentration (µg/m³)



based on telemetric measurement network

Source: VMM

Target 2015 met in 2011

Due to their small dimensions, PM_{2.5} particles can penetrate deep into the lungs and in this way introduce other pollutants that cling to the particles, into the human body. The World Health Organization (WHO) maintains that there is no safe threshold value for exposure to particulate matter. For PM_{2.5} it specifies a guideline value of 10 µg/m³ for the annual average concentration. Limit and target values are also specified in the European Air Quality Directive (2008/50/EC). The target value for 2010 is 25 µg/m³. This target value will become a limit value in 2015. The MINA plan 4 (2011-2015) has adopted this value as target for 2015. The European Directive also specifies an indicative limit value of 20 µg/m³ for 2020. This value may still be reviewed in 2013. The annual average PM_{2.5} concentrations decreased in the period 2004-2008. In the period 2009-2011, they fluctuated around 19 µg/m³. The target for 2015 was reached already in 2011. In five of the nine measurement stations, the annual average in 2011 was lower than the indicative target for 2020. The health guideline value of the WHO is, however, well below all currently measured values.

Urban background concentration

To protect human health in urban environments, Europe also specified limit and target values for the average exposure index (AEI). This index includes the three-year running average of the annual average PM_{2.5} concentrations in the urban background areas. Since 2009, VMM has been carrying out additional measurements to determine this AEI (see table). In 2015, the AEI can be a maximum of 20 µg/m³. The target in 2020 is a percentage decrease with respect to the AEI in 2011 and is dependent on the AEI in 2011 (the higher the AEI in 2011, the higher the percentage decrease required in 2020). Based on these measurements, a reduction percentage of 20 % was determined for 2020 with respect to 2011. This corresponds to an AEI of maximum 16 µg/m³ in 2020.

AEI annual averages (µg/m ³)	Bruges	Borgerhout	Schoten	Ghent
2009	17*	20	19	20
2010	19	20	19	21
2011	19	20	19	20

* between 50 and 90 % data. For calculating the AEI, only measurement stations with more than 90 % available data per year are included.