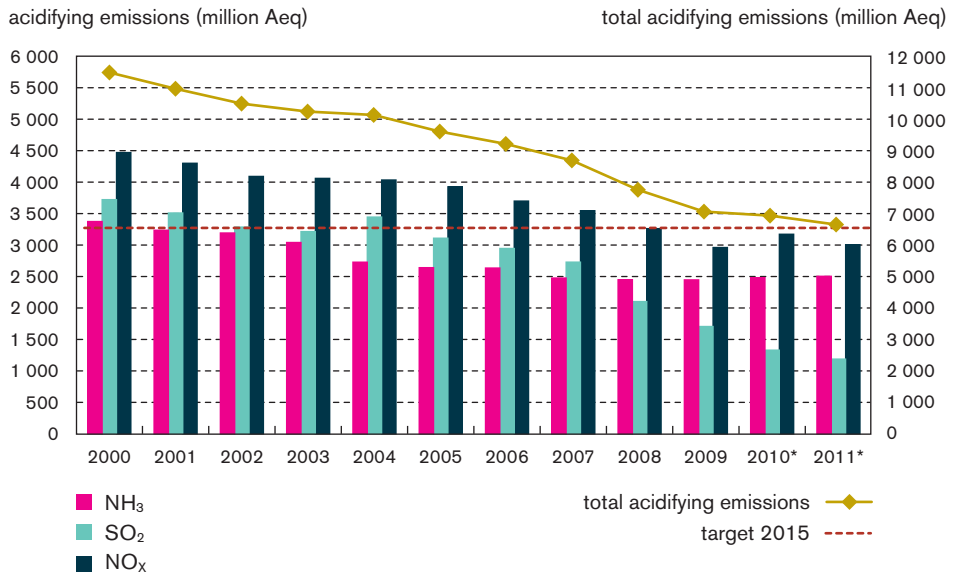
😐 Potentially acidifying emission

DPSIR



* provisional figures, emissions for 2010 from road traffic are not comparable with 2000-2009 series because of model modifications; emissions for 2011 from road traffic assumed identical with those for 2010; NH_3 emissions for 2011 from cattle breeding and fertilisers have been kept constant with 2010
Because the different acidifying substances have a different acid-forming capacity, the total potentially acidifying emission is expressed in acid equivalents (Aeq): one acid equivalent corresponds to 32 g SO_2, 46 g NO_2 or 17 g NH_3.

Source: VMM

NO_x emissions remain too high, SO_2 emissions sharply reduced

The total acidifying emissions include sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3). The MINA plan 4 (2011-2015) includes targets to be achieved by 2015 for these pollutants. The targets for SO_2 and NH_3 were already reached in 2010 and 2005 respectively. For the NO_x emissions, however, a considerable effort remains to be made.

NO_x emissions have the greatest share in acidifying emissions. The transport sector accounts for almost half of the NO_x emissions, and diesel cars emit more NO_x than petrol cars. The still increasing dieselisation of the passenger car fleet (62 % diesel vehicles in 2011), therefore, adversely affects the NO_x emissions. The Flemish Air Quality Plan for NO_2, which was approved by the Flemish Government on 30 March 2012, aims to control the share of diesel cars. For the energy sector, the NO_x emissions in 2011 decreased by 24 % in comparison with 2010. This is due mainly to the decrease in power production and the resultant reduction in NO_x emissions from conventional thermal power plants. NH_3 emissions, the second biggest contributor to acidifying emissions, have shown a rather flat curve in recent years, and are to be attributed mainly to agriculture. SO_2 emissions dropped sharply in recent years, also as a result of the reduced emissions from oil refineries. This decrease continued at a more modest pace between 2010 and 2011. SO_2 emissions from inland navigation decreased drastically in 2011 following the reduction of the sulphur content of inland navigation diesel from 0.1 % to 0.001 %. For households and trade & services, both NO_x and SO_2 emissions decreased in comparison with 2010, due to the lower heating demand in 2011.

acidifying emissions (million Aeq)	2000	2003	2006	2009	2010*	2011*
NH_3	3 374	3 041	2 635	2 447	2 482	2 504
SO_2	3 722	3 214	2 946	1 706	1 330	1 188
NO_x	4 470	4 060	3 699	2 961	3 172	3 006
total	*11 566*	*10 315*	*9 279*	*7 113*	*6 984*	*6 699*

😐 Annual mean NO_2 concentration in the air

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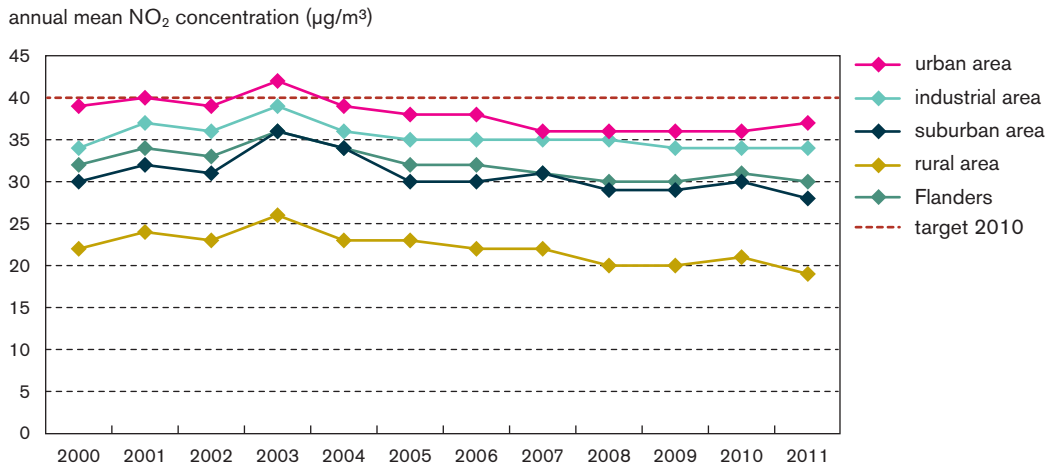

This data series is not always based on the same measurement stations. The annual mean value applies for all measurement stations, except in the zones for which a postponement was granted.

Source: VMM

Annual mean NO_2 concentrations the highest at urban measurement stations

NO_2 plays a major role in acidification, in the formation of secondary particulate matter and as an ozone precursor in photochemical air pollution. NO_2 is an oxidising gas that can cause irritation of the airways. To protect public health, the European Air Quality Directive (2008/50/EC) specifies an annual limit for NO_2 of 40 µg/m³ and an hourly limit of 200 µg/m³ that may not be exceeded more than 18 times per calendar year.

The values measured at all 36 measurement stations in Flanders were below the hourly limit in 2011. The annual mean concentrations varied between 13 µg/m³ at the rural measurement station in Houtem and 48 µg/m³ at the traffic-oriented measurement station in Borgerhout (Antwerp). An annual mean concentration of above 40 µg/m³ was measured at four measurement stations in the port of Antwerp and the Antwerp agglomeration. The Air Quality Plan for NO_2, which was approved by the Flemish Government on 30 March 2012, contains new measures aimed at achieving the annual limit for NO_2 as rapidly as possible. The plan is part of the request submitted to the European Commission for extension of the time for compliance with the standard. The European Commission granted an extension until 2015 for attaining the annual limit in the two Antwerp zones, until then a value of 60 µg/m³ applies only in these two zones.

Averaged over all measurement stations, annual mean NO_2 concentrations decreased slightly after 2003. The average concentrations were on average the highest at the urban measurement stations and the lowest at the rural stations. There is in fact a direct relationship between locations with intense road traffic and higher NO_2 concentrations. To reach the European standard for NO_2 concentrations everywhere and permanently, while at the same time reducing acidification and pollution from ozone and particulate matter, further reductions in NO_x (NO_2 and NO) emissions are needed.

annual mean NO_2 concentration (µg/m³)	2000	2003	2006	2009	2010	2011
urban area	39	42	38	36	36	37
industrial area	34	39	35	34	34	34
suburban area	30	36	30	29	30	28
rural area	22	26	22	20	21	19
Flanders	*32*	*36*	*32*	*30*	*31*	*30*

😐 Potentially acidifying deposition

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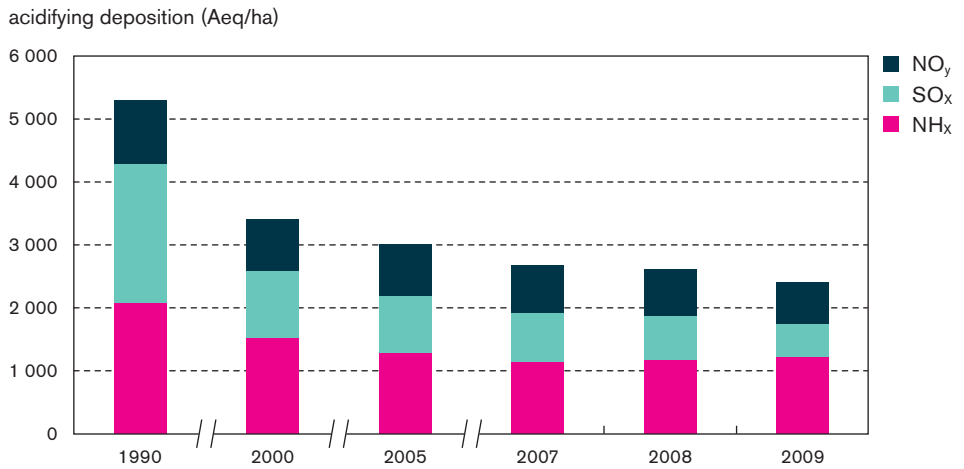

model calculations made using the VLOPS model.12

Source: VMM

Acidifying deposition continues to decrease

Too much acidifying deposition reduces the soil quality, damages vegetation and affects the biodiversity. The acidifying deposition in Flanders more than halved between 1990 and 2009. This continuous positive development is analogous to the decrease in the acidifying emissions in Flanders and the surrounding regions. In recent years, mainly the SO_x deposition decreased further and followed the downward trend in the SO_2 emissions. The decrease in NH_x and NO_y deposition was less pronounced. NH_x deposition even increased slightly (3 %) between 2008 and 2009 and in 2009 it made the largest contribution to the acidifying deposition (50 %), followed by NO_y (27 %) and SO_x (23 %).

The average acidifying deposition in Flanders was 2 401 Aeq/ha in 2009. VLAREM II specifies target values for total acidifying deposition, which vary from 1 400 to 2 400 Aeq/(ha.yr) depending on the vegetation and soil type. At various locations in Flanders, the acidifying deposition is still too high for various vegetation types. This is also indicated by the fact that the critical load for acidification is exceeded.

Imports from outside Flanders and the agriculture sector are the biggest contributors

In 2009, 44 % of the acidifying deposition in Flanders was imported. SO_x and NO_y deposition, in particular, originates to a great extent from outside Flanders (53 % and 65 % respectively). 29 % of NH_x deposition is imported from outside Flanders. The other way around, Flemish acidifying emissions cause acidifying deposition abroad. For this reason, discussions on measures for emissions reduction are conducted in an international context.

Within Flanders, the main sources are agriculture (35 %), followed by transport (8 %) and industry (4 %). Agriculture contributes mainly to NH_x deposition, transport to NO_y deposition and industry to SO_x deposition. Deposition values vary considerably across Flanders. The highest deposition values are found in the Antwerp agglomeration and in agriculture-intensive areas; such as the centre of West Flanders and the north of the province of Antwerp.

acidifying deposition (Aeq/ha)	1990	2000	2005	2007	2008	2009
NH_x	2 070	1 510	1 280	1 140	1 170	1 210
SO_x	2 220	1 072	898	772	694	538
NO_y	1 010	827	831	774	746	653
total	*5 300*	*3 409*	*3 009*	*2 686*	*2 610*	*2 401*

😐 Nature area with exceedance of the critical load for acidification

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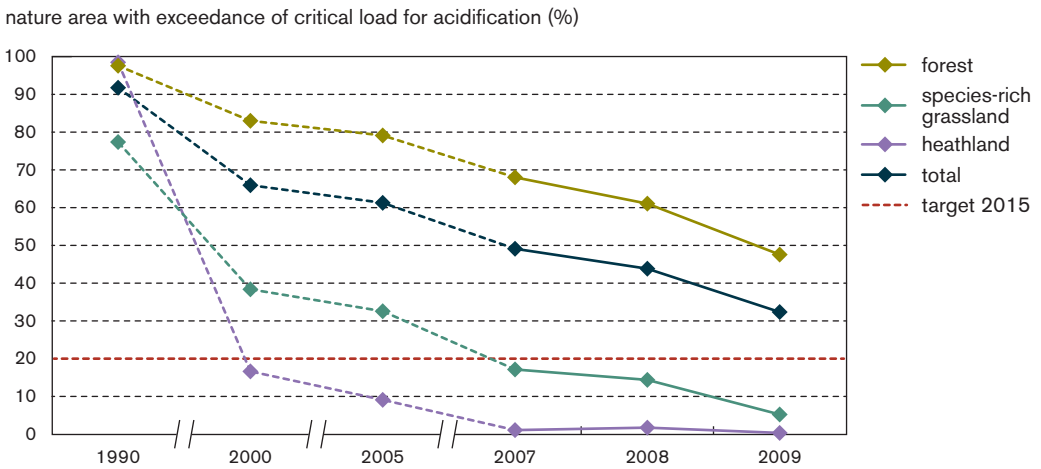

Source: VMM

Decreasing pressure on ecosystems, but further efforts still needed

Acidification causes damage to vegetation. The biodiversity is affected. Forests suffer root damage. For each type of vegetation, 'critical loads' for acidification have been determined as the damage threshold for acidifying deposition. If these deposition limits are exceeded, this leads in the long term to harmful effects on the vegetation.

In 2009, the critical load for acidification was exceeded in 32 % of the total area of terrestrial ecosystems (forest, heathland and species-rich grassland) in Flanders. This is a positive development since in 2008 critical loads were still being exceeded in 44 % of the total area. Forests remain the most sensitive, with the limits being exceeded in 48 % of the area in 2009. Between 2008 and 2009, the cases of critical loads being exceeded decreased more sharply than the acidifying deposition in these nature areas. Because the critical load is based on threshold values, even a minor decrease in deposition can, in some cases, lead to larger nature area achieving compliance with the critical load for acidification.

Efforts are still needed to meet the objective of the MINA plan 4 (2011-2015), notably to reduce the percentage of nature area where limits are being exceeded to 20 % by 2015. By comparison, the critical load was exceeded in the EU-25 in 2004 in 15 % of the nature area. The European long-term objective is to ensure that the critical loads for acidification are not exceeded in any ecosystem. Additional efforts continue to be needed to reduce the emissions of acidifying substances into the air.

Moreover, the decrease in the pressure on ecosystems in Flanders does not lead directly to a proportional recovery of the soil and biodiversity. This recovery is a very slow process, which depends, among other things, on the duration and the degree of the historic excess.

nature area with exceedance of critical load for acidification (%)	1990	2000	2005	2007	2008	2009
forest	97.6	83.0	79.1	68.0	61.1	47.6
species-rich grassland	77.4	38.4	32.6	17.1	14.4	5.2
heathland	98.5	16.6	9.1	1.1	1.7	0.3
total	*91.8*	*65.9*	*61.3*	*49.1*	*43.8*	*32.4*