

ACIDIFYING POLLUTANTS IN AMBIENT AIR

Sulphur dioxide (SO_2) and nitrogen dioxide (NO_2) are gases resulting mainly from combustion phenomena. In addition to their impact in terms of acidification, they are irritating to the respiratory tract and contribute to the formation of fine particulate matter ($PM_{2.5}$). NO_2 is an ozone precursor and is a major cause of eutrophication.

SO_2 : concentrations at historically low levels

Concentrations of SO_2 in ambient air have had major health impacts in the past¹. Following a reduction in emissions², they remain now at very low levels, both in urban/industrial and rural areas. At the beginning of the 1990s, the annual mean concentrations at the various monitoring stations varied between $9 \mu\text{g}/\text{m}^3$ (rural station at Vielsalm in 1990) and $76 \mu\text{g}/\text{m}^3$ (industrial station at Engis in 1992). By 2014, these concentrations were below $4 \mu\text{g}/\text{m}^3$ at all stations³, with the exception of the Engis station ($6 \mu\text{g}/\text{m}^3$). Furthermore, no exceedances of the limit values for the protection of human health⁴ were observed in Walloon territory, with hourly and daily maximum levels recorded in 2014 of $208 \mu\text{g}/\text{m}^3$ and $37 \mu\text{g}/\text{m}^3$ respectively. However, the WHO daily guideline value ($20 \mu\text{g}/\text{m}^3$ over 24 hours)⁵, which is stricter than that of Directive 2008/50/EC, was exceeded 5 times in Engis during 2014.

The critical level for the protection of vegetation ($20 \mu\text{g}/\text{m}^3$ per year and from 01/10 to 31/03)⁶ was not exceeded once during 2014 and winter 2013 - 2014.

Concentrations of NO_2 in compliance with standards

In 2014, annual mean NO_2 concentrations varied between 6 and $32 \mu\text{g}/\text{m}^3$ depending on the station, thereby meeting the annual limit value for the protection of human health ($40 \mu\text{g}/\text{m}^3$)⁶. Concentrations were highest in urban and industrial/urban stations. The rural stations had lower concentrations,

which could be distinguished according to their distance from human activities and traffic density. The hourly limit value ($200 \mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times per year)⁶ was also respected, with the maximum hourly limit recorded in 2014 being $171 \mu\text{g}/\text{m}^3$ at the Mons station.

The critical level for the protection of vegetation ($30 \mu\text{g}$ of NO_x/m^3 per year)⁶ was also respected, with mean concentrations of NO_x (expressed in NO_2) ranging from $7 \mu\text{g}/\text{m}^3$ to $15 \mu\text{g}/\text{m}^3$ depending on the stations.

A favourable evolution in NO_2 concentrations

Between 2001 and 2014, annual mean concentrations of NO_2 decreased from 19% to 57%, depending on the stations, with the exception of the Mons station, where concentrations showed little change (-4%). This decrease is due to the reduction in NO_x emissions. Since 2008, annual means have remained⁷ below the $40 \mu\text{g}/\text{m}^3$ threshold, and exceedances of the hourly limit for health have not been observed since 2010 (Engis station).

^[1] Pollution episode in the Meuse valley in 1930 resulting in an increase in mortality | ^[2] → AIR 2 | ^[3] The SO_2 was measured across 15 sites in 2014. | ^[4] Hourly limit value ($350 \mu\text{g}/\text{m}^3$ not to be exceeded more than 24 times per year) and daily limit value ($125 \mu\text{g}/\text{m}^3$ not to be exceeded more than 3 times per year) (Directive 2008/50/EC) | ^[5] WHO, 2006 | ^[6] Directive 2008/50/EC | ^[7] The threshold of $40 \mu\text{g}/\text{m}^3$ was systematically exceeded between 2003 and 2007 at the Charleroi station.

Fig. AIR 9-1 Annual mean concentrations of nitrogen dioxide (NO_2) in ambient air in Wallonia

