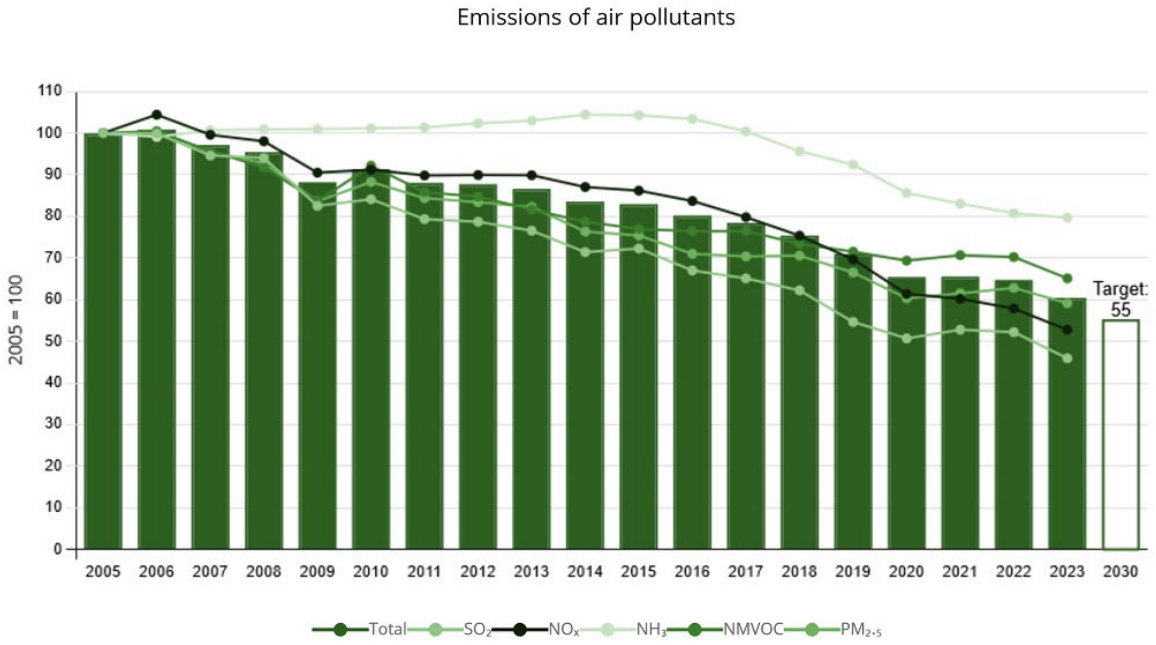
Air pollution – *Keeping the environment healthy*

3.2.a Emissions of air pollutants



Note(s):
2023 provisional data.

Data source(s):
German Environment Agency

Definition
The indicator represents the mean value of the indices of national emissions of the five air pollutants sulphur dioxide (SO_2), nitrogen oxide (NO_x), ammonia (NH_3), volatile organic compounds (NMVOCs) and particulate matter ($PM_{2.5}$) compared to the base year 2005.

Intention
Air pollution not only affects people's health, but also ecosystems and biodiversity. The unweighted average of emissions of certain air pollutants should therefore fall by 45% by 2030 compared to 2005. This target is based on Germany's commitment to the European Union (EU) to reduce emissions of individual air pollutants by 2030 as follows: Sulphur dioxide (SO_2) by 58%, nitrogen oxide (NO_x) by 65%, ammonia (NH3) by 29%, volatile organic compounds (NMVOCs) by 28% and particulate matter ($PM_{2.5}$) by 43%.

Target
Reduction of emissions to 55% of 2005 level (unweighted average of the five pollutants) by 2030

Content and progress

This indicator represents the unweighted arithmetic mean of the percentage change in emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x), ammonia (NH_3), non-methane volatile organic compounds (NMVOCs), and fine particulate matter ($PM_{2.5}$) released in Germany. The rates of change for each air pollutant are incorporated equally into the calculation – regardless of their differing sources and environmental impacts. As a result, the indicator is only indirectly linked to compliance with binding emission reduction targets agreed with the European Union (EU). It is therefore possible for the overall reduction target of the indicator to be met, while individual pollutant-specific reduction targets are missed.

The underlying data, which serve as the basis for reporting obligations under the Geneva Convention on Long-range Transboundary Air Pollution (CLRTAP) and the EU National Emission Ceilings (NEC) Directive, are collected annually by the Federal Environment Agency (UBA). Subsequently, the System of Environmental-Economic Accounting (SEEA) of the Federal Statistical Office process these data further, breaking them down by economic sector and private households.

According to preliminary calculations, total emissions of air pollutants had declined by 39.5% by 2023 compared with 2005. This indicates that the indicator is progressing in the desired direction and, if the current trend continues, the goal of reducing emissions to 55% of 2005 levels by 2030 would be met. However, the reduction in emissions of individual pollutants between 2005 and 2023 varied considerably. Based on recent trends, the emission reduction commitments entered into by Germany for each individual air pollutant under EU law could be achieved by 2030.

Emissions of non-methane volatile organic compounds (NMVOCs), mainly caused by the industrial use of solvents, were significantly reduced by 34.9% over the reporting period. Emissions of fine particulate matter ($PM_{2.5}$) decreased by 40.9% between 2005 and 2023. In 2023, the largest share of $PM_{2.5}$emissions came from households and small consumers, accounting for 26.2%. Industry was responsible for 27.5% of emissions. The transport sector accounted for 24.3% of $PM_{2.5}$ emissions – a decrease of 10 percentage points compared to 2005.

Emissions of nitrogen oxides (NO_x) declined by 47.3% by 2023 compared with 2005, also progressing in the desired direction. In 2023, the main sources of nitrogen oxide emissions were the transport sector and the energy industry. Sulphur dioxide (SO_2) emissions, which predominantly arise from the energy sector, fell by 54.1% over the same period.

Ammonia (NH_3) emissions first fell significantly below 2005 levels in 2018. Across the full period from 2005 to 2023, the reduction totalled 20.3%. However, between 2005 and 2018, there were intermittent increases in ammonia emissions, resulting in only a moderate overall decline. The main driver behind the increases during this period was the agricultural use of land, particularly the spreading of fermentation residues from the digestion of energy crops. Approximately half of ammonia emissions can be attributed to this source group.

Type of target
Target with specific target value

Assessment
Emissions of air pollutants should be reduced to a maximum of 55% of the 2005 level by 2030.

According to the target formulation, if the average trend of the past six years continues, the politically defined target would already be achieved in 2025, despite the stagnation observed in 2021 and 2022. Indicator 3.2.a is therefore assessed as sun for 2023.