

clearing the air



POP_s NO_x NITROGEN DIOXIDE SO₂
SULPHUR DIOXIDE AMMONIA
HNO₃ VOC_s PM_{2.5}
AMMONIA

30th Anniversary of the Convention on
Long-range Transboundary Air Pollution

2009

materials industry energy eutrophication health losses
yield losses human health agriculture eutrophication industry acidification

traffic



UNITED NATIONS

clearing the air





.....➤ The atmosphere is one of the largest waste disposal units for mankind. It has handled gaseous and particulate waste from combustion and other human activities for hundreds of years. These activities have had serious consequences such as acid rain, the degradation of valuable ecosystems and agricultural soils, and detrimental impacts on human health.



→ A thirty-year fight continues...

It was in Scandinavia in the late 1970s that the problems of acid rain were first observed. People began to realize that the origins of this pollution was not in their national boundaries. In 1979, some 30 nations signed the Convention on Long-range Transboundary Air Pollution (CLRTAP). Initially aimed at reducing the effects of acid rain through control of the emissions of sulphur, its scope later widened to include nitrogen pollutants, volatile organic compounds, heavy metals and persistent organic pollutants. The Convention functions within the United Nations Economic Commission for Europe (UNECE) of which all the countries of Europe, the Caucasus and Central Asia are members, as well as the United States and Canada. The Convention entered into force in 1983; currently, 51 out of the 56 UNECE member States are Parties.

The Convention provides a general framework for collaboration to limit, gradually reduce and prevent air pollution. It has been extended by eight protocols that impose concrete obligations to tackle specific pollutants and environmental problems. The sufficiency and effectiveness of these obligations are regularly under review.



From acid rain...

Nitrogen Oxides and Sulphur Dioxide

Acid rain is a result of air pollution. When any type of fuel is burnt, a lot of different chemicals are produced. The smoke that comes from a fire or the fumes that come from car exhaust do not just contain the sooty grey and black particles that you can see – they also include invisible gases that can be even more harmful to our environment. Some of these gases (especially nitrogen oxides and sulphur dioxide) react with the tiny droplets of water in clouds to form sulphuric and nitric acids. The rain from these clouds falls as a very weak acid – which is why it is known as “acid rain”. In the effort to curb air pollution impacts, the Convention targeted two key pollutants early on: nitrogen oxide (NO_x) and sulphur dioxide (SO_2). Both of these pollutants have decreased significantly.



SULPHUR DIOXIDE (SO_2)

Emitted when fuels containing sulphur are burned

Contributes to acid deposition leading to adverse affects on materials, and terrestrial and aquatic ecosystems

Since 1990, emissions of SO_2 have decreased by about 70% in Europe and about 35% in the United States

NITROGEN OXIDES (NO_x)

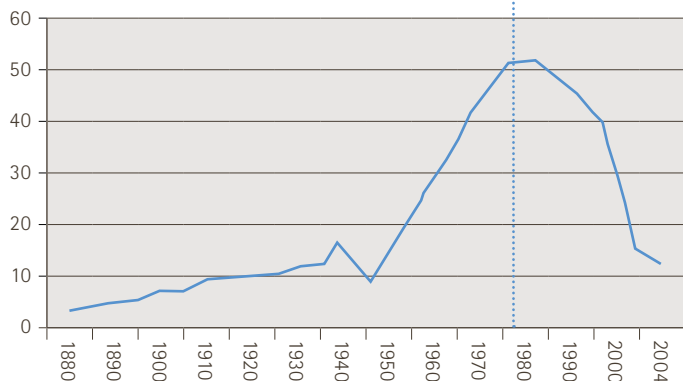
Also contributes to acid deposition and is responsible for eutrophication, reduction in water quality and species richness, and contributes to ground-level ozone formation

Associated with adverse affects on human health as high concentrations cause respiratory illnesses

Since 1990, European NO_x emissions have been reduced by 35% while U.S. emissions have been reduced by 25%

The Convention on Long-range Transboundary Air Pollution goes into force

TgSO_2



Emissions of sulphur dioxide in Europe over the period 1880–2004

Source: Verstreng et al. *Atmospheric Chemistry and Physics* 2007

...to air pollutants with severe health and environmental effects

Persistent Organic Pollutants, Volatile Organic Compounds and Heavy Metals

As the detrimental effects of air pollution are linked to numerous issues ranging from human health to ecosystem degradation, the Convention has extended its influence by regulating an increasing number of harmful pollutants through its protocols. These include volatile organic compounds (VOCs), persistent organic pollutants (POPs), and heavy metals. Over the past 30 years, the targets for these pollutants have become increasingly stringent, and member countries have consistently worked to reduce emissions in the effort to curb air pollution impacts.



Volatile Organic Compounds

The Convention’s VOC and Gothenburg protocols establish strict emissions targets for these air pollutants

Are responsible for the formation of ground-level ozone, amongst other harmful substances

Emitted from various sources of combustion (i.e. vehicular, industrial), dry-cleaning and paint application

Evidence that relative leukemia and lymphoma can increase through prolonged exposure to VOCs

Persistent Organic Pollutants

The Convention’s protocol on POPs addresses pesticides, industrial chemicals, by-products and contaminants

The Protocol notably bans the production and use of some of these toxic substances, while severely restricting the use of others

Exposure can cause the disruption of the endocrine, reproductive, and immune systems; neurobehavioural disorders; and cancers

Heavy Metals

The Convention’s protocol on Heavy Metals focuses upon reducing lead, cadmium and mercury

The Protocol obliges its Parties to reduce the emissions through actions such as the phasing-out of leaded petrol

Exposure to these three metals has been linked to increased risk of cancer, respiratory illness, neurological disorders and ecosystem degradation

Tackling multiple effects with multiple targets

The Gothenburg Protocol

The impacts of air pollution are vast and require an integrated approach that can reduce the levels of multiple pollutants and thus better protect the environment and our health. In response the Convention's Gothenburg Protocol entered into force in 2005, with 25 countries ratifying it, thus far. The Protocol sets emission ceilings for 2010 for four pollutants: sulphur, NO_x, VOCs and ammonia. It addresses acidification, eutrophication and ground-level ozone in an effect based and integrated manner, motivated by the substantial increase in cost-effectiveness of a combined policy strategy. It has been estimated that this combined approach will reduce the cost of air pollution policy by about 75% as compared to a single pollutant approach. The Protocol is expected to be extended via the inclusion of particulate matter (PM_{2.5}) – a harmful pollutant linked to higher rates of asthma and respiratory illness, and through the acknowledgement of links to climate change. For the purpose of analyzing integrated emission reduction strategies, integrated assessment models have been developed. Such models have allowed for the development of scenarios showing how to achieve multiple environmental goals in a cost-effective manner.

Sources

Emitted
compounds

Effect-causing
pollutants



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https://www.yunbaogao.cn/report/index/report?reportId=5_2151

