

Towards Cleaner Air Scientific Assessment Report 2016

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This document was prepared under the auspices of the EMEP Steering Body and the Working Group on Effects at the request of the Executive Body of the UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP). The EMEP Steering Body and the Working Group on Effects cover the scientific network within the UNECE region. This network was developed over the past 35 years in order to support effect-based cost-effective air pollution policies with the best available knowledge.

This assessment report summarises current scientific knowledge on transboundary air pollution issues within the UNECE region and describes the effectiveness of air pollution measures in addressing large-scale effects on forests and lakes as well as in protecting human health and preventing other air pollution effects, such as loss in biodiversity and damage to crops, the built environment and cultural heritage.

The assessment of emission reduction achievements is based on a report on trends in air pollution and impacts coordinated by the Working Group on Effectsⁱ, a report on air pollution trends between 1990 and 2012 by the EMEP Task Force on Measurements and Modellingⁱⁱ, and an assessment for North America by the U.S. Environmental Protection Agency (EPA) and Environment and Climate Change Canadaⁱⁱⁱ.

Opportunities identified for means to tackle remaining challenges are mainly based on work by the EMEP Task Force on Hemispheric Transport on Air Pollution, the Meteorological Synthesizing Centre-West, the Meteorological Synthesizing Centre-East, and the Centre on Integrated Assessment Modelling.

The aim of this assessment is to serve as a basis for considering new directions for policy development and for identifying policy-relevant research questions. The international co-operative approach, which includes interaction between science and policy, as developed under the Convention, provides a good basis for exploring synergies between air pollution and climate change, agriculture and biodiversity, and energy and public health policies on the urban, national, continental and hemispheric scale.

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Rob Maas, Peringe Grennfelt, editors

Contents

Summary for Policymakers i
Scientific Assessment Report 2016
Part A: Where are we?
1. Health impacts of air pollution 1 1.1 Air pollution is a major threat to health 1 1.2 International attention on air quality and health is increasing 2 1.3 Progress in policy development 3
2. Nitrogen and biodiversity 4 2.1 Large deterioration in biodiversity in Europe 4 2.2 Reduction of ammonia emissions is lagging behind 5
3. Acidification of lakes and forest soils 7 3.1 Acid deposition started transboundary air policy 7 3.2 Recovery of damaged ecosystems 7
4. Ozone trends and impacts on health and crop yields124.1 Health effects from short-term and long-term exposure124.2 Peak ozone concentrations decline134.3 Ozone damage to vegetation144.4 Transcontinental fluxes influence ozone trends14
5. Persistent pollutants 17 5.1 Emissions. 17 5.2 Atmospheric trends. 17 5.3 Transboundary transport and secondary sources 18 5.4 Impacts 19 5.5 Remaining issues 19
Part B: What are the key challenges and opportunities?
6. Air pollution abatement benefits the economy 20 6.1 Health damage has significant costs

7. Transboundary and multi-sectoral approaches	22
7.1 Future projections	22
7.2 Ammonia is becoming an important source of PM exposure .	22
7.3 Transboundary air pollution policy remains important	23
7.4 Measures to reduce ammonia are beneficial for	
health and nature	23
7.5 Wood burning	23
8. Air pollution at a wider scale	25
8.1 Hemispheric scale of ozone pollution	25
8.2 Global ozone precursor emission changes between	
1990 and 2010	25
8.3 Ozone scenarios for 2010 to 2050	26
8.4 Mercury's global reach	29
9. Air quality and climate change: two sides of	
the same coin	30
9.1 Co-benefits for climate change	30
9.2 Co-benefits for air pollution.	30
9.3 Air quality and agriculture	32
9.4 Air pollution policy contributes to sustainable	
development goals	32
10. Institutional arrangements	33
10.1 Obstacles to ratification	35
10.2 Further work	35
Annex: Emission trends per country 1990-2010	36
References	46
Acronyms and Abbreviations	50

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Summary for **Policymakers**



Key Findings

Abatement measures under the 1979 Convention on Long-range Transboundary Air Pollution (CLRTAP) and its protocols have achieved significant success. There has been a sharp decline in emissions, especially for sulphur, and economic growth and trends in air pollution have been progressively decoupled.

2 Despite successes - abatement has resulted in an extra year of average life expectancy in Europe, soil acidification has been halted in most parts of Europe, and declining acidification in lakes has led to fish stocks recovering in areas where they had largely disappeared - problems still exist.

3 A significant proportion of the urban population in Europe and North America is exposed to concentrations of fine particles and ozone that are near or above the WHO guideline level and, despite soils and lakes recovering from acidification across large parts of Europe, nitrogen deposition in many parts still exceeds the level below which harmful effects do not occur.

4 Because transboundary sources are often major contributors to urban pollution, many European cities will be unable to meet WHO guideline levels for air pollutants through local action alone. Even national and Europewide action may not be enough in some cases.

5 Long-term risks due to ozone, heavy metals and persistent organic pollutants continue to exist in many UNECE countries. In addition to implementing CLRTAP Protocols, reducing background levels and exposure will require broader coordination beyond the European or North American scale, as well as coordination with other international fora such as the Minamata Convention on Mercury and the Stockholm Convention on Persistent Organic Pollutants.



6 Technical measures are available to reduce fine particles and ozone to levels below the WHO guidelines in most parts of Europe and North America and to avoid excess nitrogen in most nature areas. Successful examples of healthy lifestyles that contribute to cleaner air are also available.

Air pollution control costs are generally significantly lower than the costs of damage to health and the environment. In many countries the net impact of abatement measures on national income and employment will be neutral because production of the technologies required will also create employment.

An integrated approach to climate change and air pollution could lead to significant co-benefits, as well as to reducing the risk of applying climate change measures with significant negative impacts on air quality. Ratification and implementation of the 2012 revision of the Gothenburg Protocol would reduce emissions of sulphur dioxide, nitrogen oxides and particulate matter by 40-45% between 2005 and 2020, according to estimates made in 2011. For ammonia the reduction would be 17%. Ratification enables a regionally-level playing field for industries and so prevents countries from competing with each other at the expense of the environment and health. Exploring synergies between air pollution policy at the local, regional and hemispheric scale, as well as with energy, transport and agricultural policy, could help identify additional cost-effective measures.

10 International policy collaboration and coordination of air pollution science remains essential to harmonise methods for estimating emissions, monitoring air quality and impacts, and identifying cost-effective further steps.

Introduction

Viewed largely as a local issue during the 1950s and 1960s, air pollution began to be acknowledged as a larger-scale issue during the 1970s and 1980s. This is when it became clear that widespread acidification of forests and lakes in northern Europe could only have been caused by pollutants carried into the region by air masses moving across industrial regions in countries far away from the problems. These long-range impacts became the main drivers for the development of joint scientific and monitoring efforts as well as for policy negotiations under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

Since its establishment in 1979, primarily to deal with problems of air pollution on a broad regional basis the Convention has promoted a mutual exchange of information between scientists and policymakers. Coupled with good intergovernmental cooperation this has resulted in a sharp reduction in emissions, particularly for sulphur dioxide. Soil acidification has been halted in most parts of Europe and declining acidification in lakes has resulted in the recovery of fish stocks in areas where they had all but disappeared.

Despite clear successes and good cooperation facilitated by the Convention among countries of the northern hemisphere, including those of North America, current scientific findings show air pollutants (including fine particles, ozone, nitrogen, heavy metals and persistent organic pollutants) are still causing health and ecosystem effects in the UNECE region.

Abatement measures see significant success

Abatement measures for sulphur under the Convention have prevented emissions in Europe from more than doubling over the past 30 years. In fact, by applying measures such as flue gas desulphurisation and low-sulphur fuels, countries have achieved a total reduction in sulphur emissions of about 80% since 1990. Abatement measures for nitrogen oxides, which include flue gas cleaning

ACIDIFICATION - A SUCCESS STORY

Addressing the health impacts of particulate matter presents comparable challenges

abatement (and so improve ecosystem health) also resulted in lower particulate

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