Particulate emissions and population exposure

Degraded air quality can have substantial economic and social consequences, from health costs and building restoration needs to reduced agricultural output, forest damage and a generally lower quality of life.

The concentration of pollutants in air raises major concerns as to its effects on human health. Human exposure is particularly high in urban areas where economic activities are concentrated. Causes of growing concern are concentrations of fine particulates ($PM_{2.5}$), nitrogen dioxide (NO_2), toxic air pollutants, and ground-level ozone pollution.

Definitions

The indicators presented here refer to:

- Emissions of fine particulates from human activities, given as quantities of $PM_{2.5}$. The data show emission intensities per capita and changes over time.
- Population exposure to air pollution by fine particulates. The indicators reflect the estimated annual mean exposure level of an average resident to outdoor particulate matter, expressed as population weighted $PM_{2.5}$ levels; and the share of population exposed to levels exceeding 10 micrograms per m^3 (WHO long-term guideline value). They provide a general indication of the relative risk of PM pollution.

Fine particulates ($PM_{2.5}$) refer to suspended particulates smaller than 2.5 microns in diameter that are capable of penetrating very deep into the respiratory tract and causing severe health effects. They are potentially more toxic than small particulates (PM_{10}) and may include heavy metals and toxic organic substances.

The indicators shown here provide only a partial view of air pollution. They should be complemented with information on other air pollutants, and be read in connection with data on socio-demographic patterns, climatic conditions, and emission and fuel standards.

Overview

Over the past two decades, urban air quality has continued to improve slowly with respect to sulphur dioxide (SO_2) concentrations, and human exposure to small particulates (PM_{10}) has been decreasing.

But acute ground-level ozone pollution episodes in both urban and rural areas, NO_2 concentrations, fine particulates ($PM_{2.5}$), and toxic air pollutants are of growing concern. This is largely due to the concentration of pollution sources in urban areas and to the increasing use of private vehicles for urban trips.

Some groups of the population are especially vulnerable to air pollution. The very young and the very old are more at risk than the remainder of the population.

In several OECD countries per capita emissions of fine particulates and the share of the population exposed to $PM_{2.5}$ concentrations above the WHO guideline value have fallen. But, in about half of the countries, more than 90% of the population is still exposed to concentrations above the WHO guideline.

The cost of the health impact of air pollution in OECD countries – in terms of what people would be willing to pay to avoid fatalities – has been estimated at USD 1.7 trillion. Road transport would account for about half of this cost.

If no new policies are implemented, urban air quality will continue to deteriorate globally, and with increasing urbanisation and population ageing, outdoor air pollution will become the top cause of environment-related deaths by 2050.

Comparability

International data on particulate emissions are available for many but not all OECD countries. The estimation methods for emissions, the extent of sources and particles included in estimation, may differ from one country to another.

International data on exposure to air pollution exist, but often are scattered (sources: WHO, World Bank, OECD, EEA). The most comprehensive effort to measure exposure levels worldwide is the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD).

Sources

OECD (2014), "Air Emissions by Source", *OECD Environment Statistics* (database), *http://dx.doi.org/10.1787/data-00598-en*.

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World Bank (2015), *World Development Indicators*, *http://data.worldbank.org/data-catalog/world-developmentindicators*.

Further information

OECD (2015a), *How's Life? 2015: Measuring Well-Being*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/how_life-2015-en*.

OECD (2015b), *OECD Regions at a Glance 2015*, OECD Publishing, Paris, forthcoming.

OECD (2014a), *How's Life in Your Region?: Measuring Regional and LocalWell-Being for Policy Making*, OECD Publishing, *http://dx.doi.org/10.1787/9789264217416-en*.

OECD (2014b), *The Cost of Air Pollution: Health Impacts of Road Transport*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264210448-en*.

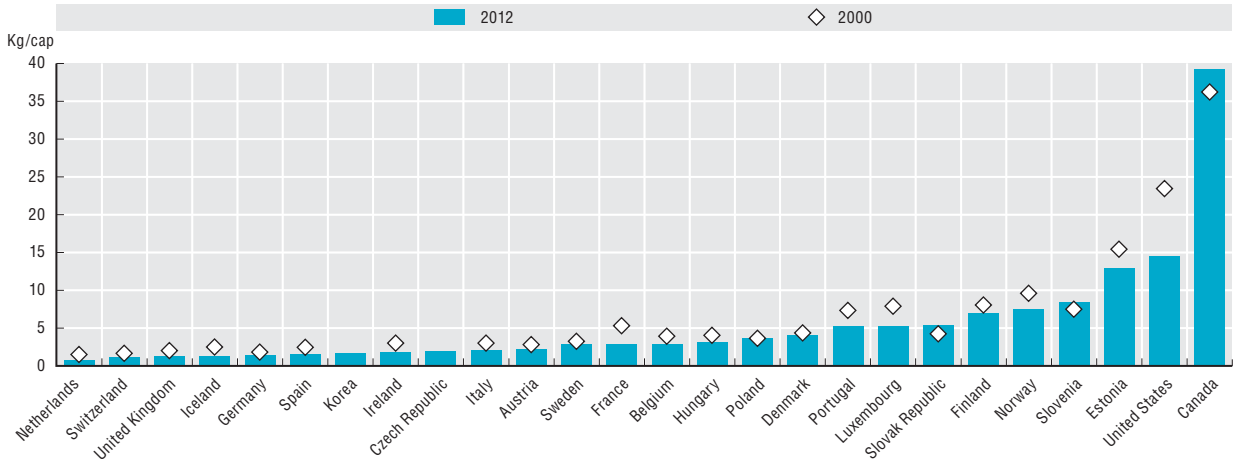
OECD (2012), *OECD Environmental Outlook to 2050: The Consequences of Inaction*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264122246-en*.

UNECE (2014), "Convention on Long-Range Transboundary Air Pollution", *www.unece.org/env/lrtap/multi_h1.html*.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

Figure 1.15. **Emission intensities of fine particulates ($PM_{2.5}$)**

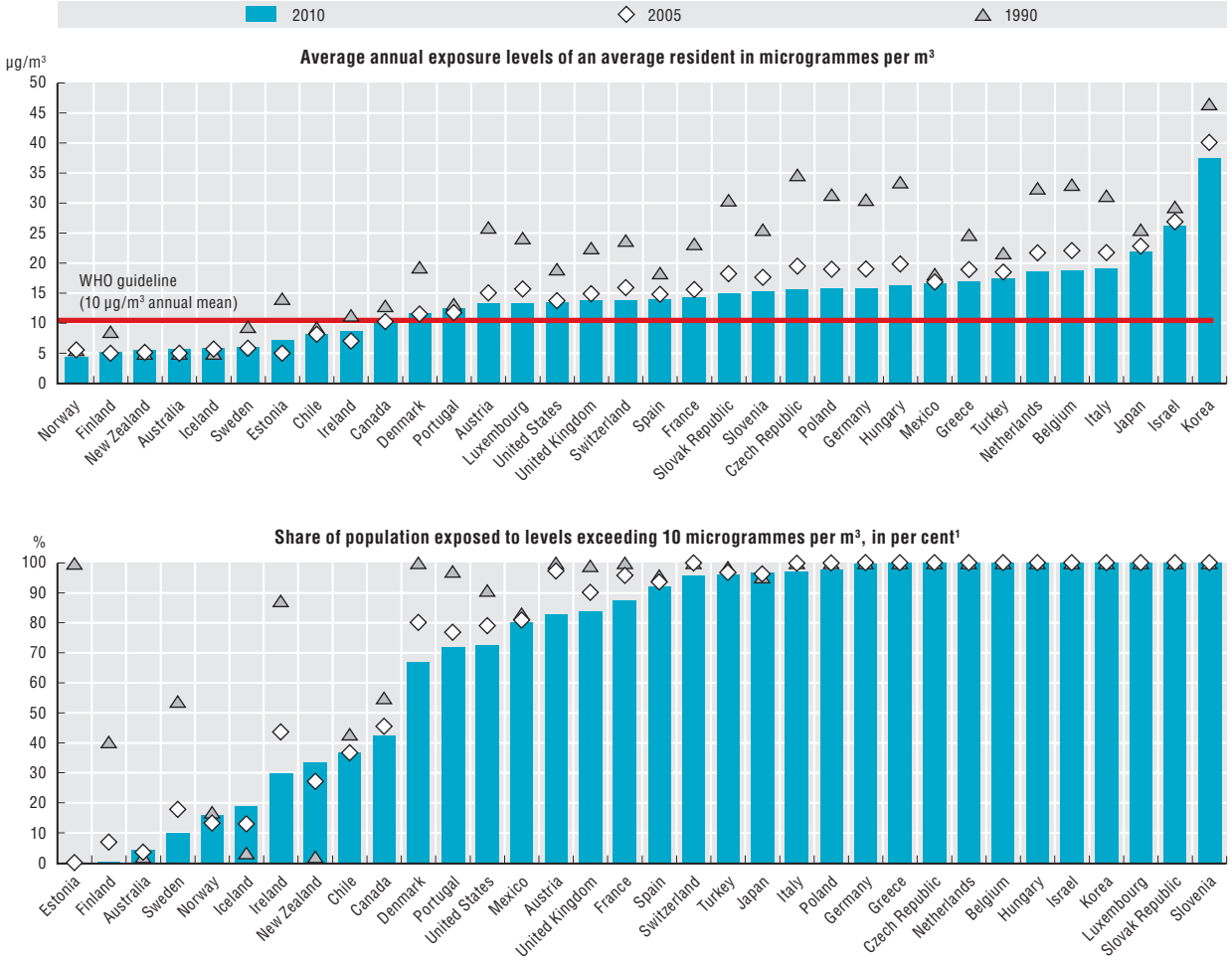
Emissions per capita, selected countries, 2012, 2000



1. See the Annex for country notes.
Source: OECD (2014), "Air Emissions by Source", *OECD Environment Statistics* (database); European Monitoring and Evaluation Programme (EMEP) (2014).

StatLink http://dx.doi.org/10.1787/888933261822

Figure 1.16. **Population exposure to fine particulates ($PM_{2.5}$)**



1. WHO guideline value
2. See the Annex for country notes.
Source: World Bank (2015), *World Development Indicators* (database).

StatLink http://dx.doi.org/10.1787/888933261830