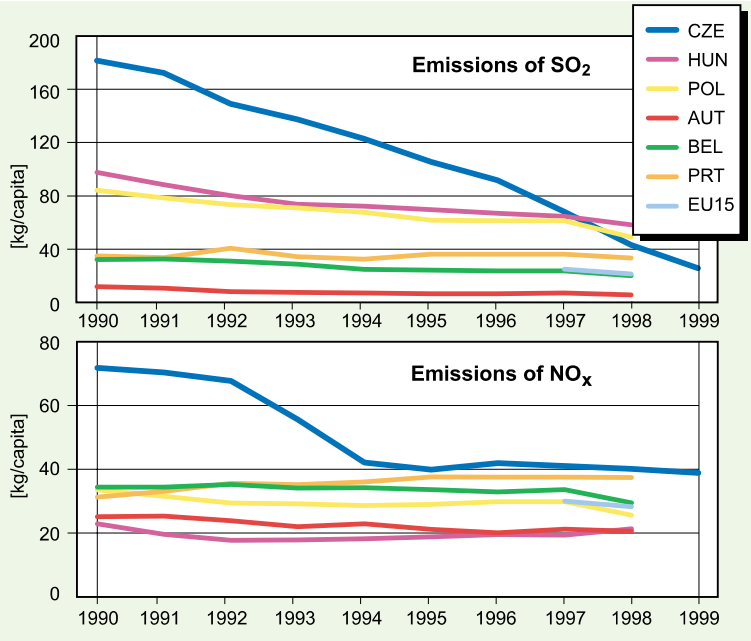
III. ENVIRONMENT

Air pollution

Box 3.1. Annual SO_2 and NO_x emissions per capita, international comparison, 1990-99

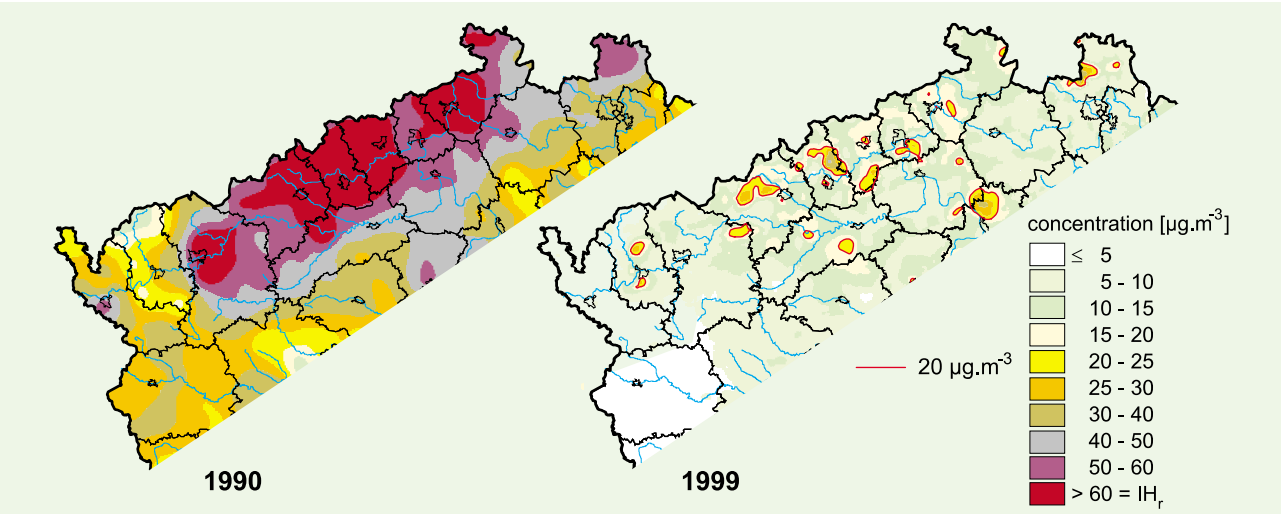


Source: OECD, Czech Hydrometeorological Institute

Air quality has improved significantly over the last ten years. The major contributors to this improvement were a large decrease in emissions of sulphur dioxide (SO_2) and suspended particulate matter - they fell by 89 and 86 percent respectively, from 1990 to 1999 - as well as total nitrogen oxides (NO_x) emissions, for which the corresponding figure is 47 percent. However, total nitrogen oxides emissions have remained constant over the last four years (with the exception of a slight decrease in 1999) as a result of transport emissions - mobile sources accounted for 60 percent of NO_x emissions in 1999. Emissions of heavy metals have also fallen significantly - emissions of mercury, cadmium and lead have since 1990 decreased by 36, 42 and 43 percent respectively. Emissions of volatile organic compounds (VOCs) decreased by 39 percent in the same period, and so the Czech Republic met its international obligations under the UN ECE Convention on Long-Range Transboundary Air Pollution (CLRTAP). Finally, annual emissions of persistent organic compounds (PAU, PCB and PCDD/F) have fallen by 13-41 percent since 1990.

Despite the enormous effort and remarkable results in air pollution abatement, specific emissions of sulphur and nitrogen oxides remain above the EU average: annual emissions of SO_x in the Czech Republic were 25.6 kg/person/year in 1999, compared to an EU average of 21.3 kg/person/year (data from 1996-97); annual emissions of NO_x in the Czech Republic were 38.8 kg/person/year in 1999, against 28.3 kg/person/year in the EU.

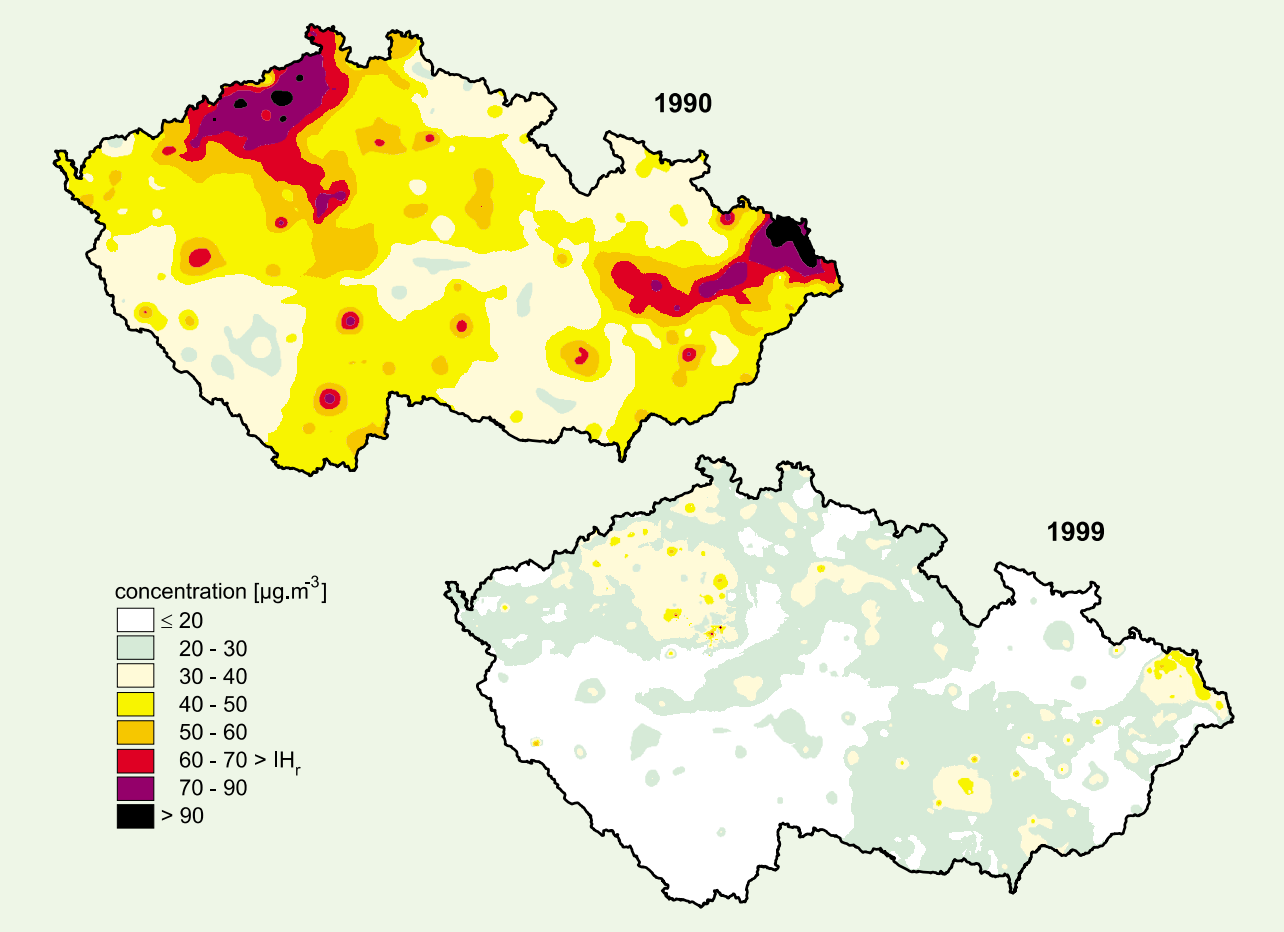
Box 3.2.a Annual arithmetic means of SO_2 concentrations in Northern Bohemia, 1990 and 1999



Source: Czech Hydrometeorological Institute

Note: The limit value of 20 µg.m^{-3} is set with respect to ecosystem health

Box 3.2.b Annual arithmetic means of suspended particulate matter concentrations in the Czech Republic, 1990 and 1999

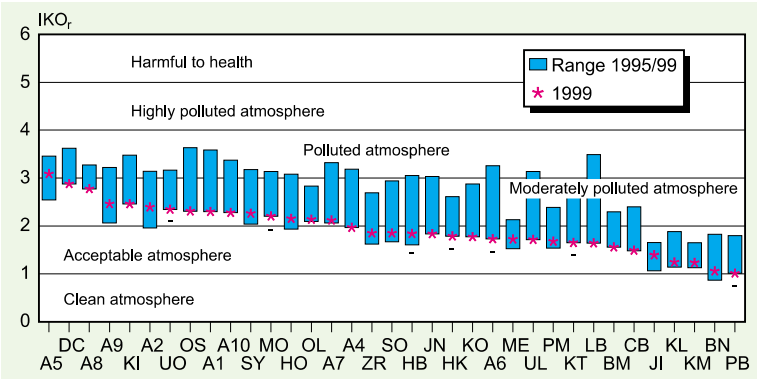


Source: Czech Hydrometeorological Institute

Air pollution maps of the Czech Republic showed frequent exceedances of air quality limits for the main pollutants ten years ago (especially in Northern Bohemia, Prague and Ostrava). Since then, atmospheric concentrations of SO_2 and suspended particulate matter have fallen dramatically across virtually the whole country. Concentrations of NO_x showed slightly increasing trends until 1997. A slight decrease was firstly recorded in 1998 and confirmed in 1999; the annual ambient standards were however exceeded in places with heavy traffic.

The parameter IKO_r[2] is an index used to describe overall air quality in any given year, and in 1999 was calculated for 36 sites (major cities - including Prague - around the whole country). Fifteen of these fell into the third category corresponding to moderately poor air quality, and one location, Prague 5, into the fourth category (poor air quality). All the other sites were in the second category, indicating acceptable air quality. Time-series analysis indicates that air quality at most sites is stable, with a significant improvement in air quality recorded in seven sites.

Box 3.3. Annual index of air quality (IKO_r) in selected Czech cities, 1995-99



Source: National Institute of Public Health

[2] The methodology has been developed by the National Institute of Public Health in Prague. For details see the System of Monitoring the Environmental Impact on Population Health of the Czech Republic

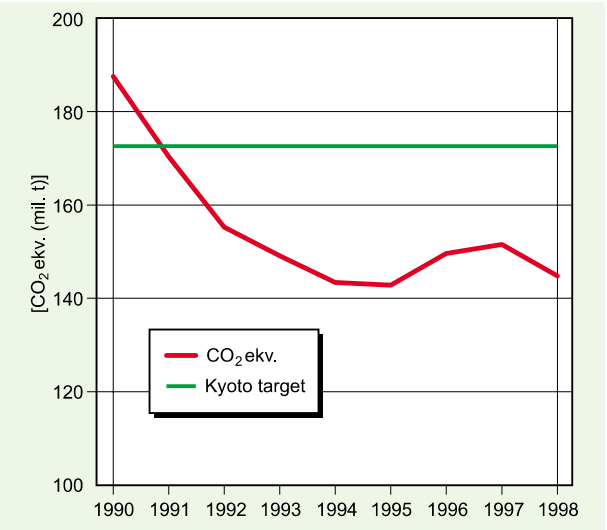
Note: IKO is an air quality index. The measured concentration of contaminants measured are compared with corresponding limit values and transformed into a dimensionless parameter describing the ambient air quliaty at six levels. 0-1 = clean atmosphere, 1-2 = acceptable, 2-3 = moderately polluted, 4-5 = highly polluted, 5-6 harmful to health. For the city initials see the Box 1.6.

Climate change

Emissions of, and sinks for, greenhouse gases have been regularly monitored in the Czech Republic since 1993, when the country ratified the United Nations Framework Convention on Climate Change (UN FCCC).

Total Czech emissions of greenhouse gases (GHG) expressed as CO_2eq decreased from 187 million tonnes in 1990 to 145 million tonnes in 1998 - a fall of over 20 percent. The reduction in emissions is therefore well below the target of 8 percent below the 1990 level, as agreed in the Kyoto Protocol to the UN FCCC, signed by the Czech Republic in 1998. This reduction has been achieved primarily through a decrease in energy consumption and structural changes in the energy sector, as well as by the overall transformation of the economy. Since the various emission projections predict emission growth after the year 2000, the Government has approved a comprehensive programme for greenhouse gas emission reduction, the *Climate Change Mitigation Strategy of the Czech Republic.*

Box 3.4. Total emissions in the CR of the Kyoto Protocol greenhouse gases, 1990-98

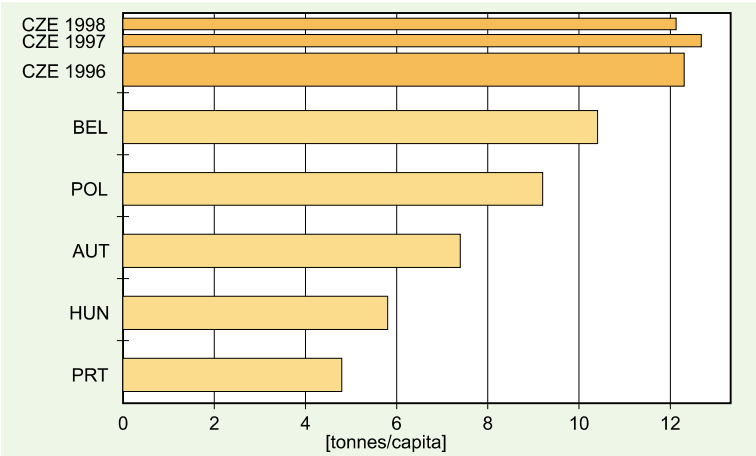


Source: Ministry of Environment

The national GHG inventory has been compiled for the Czech Republic since 1990 and shows that CO_2 currently represents about 86 percent of total GHG emissions; the other major greenhouse gases for the country are methane (7.7 percent) and N_2O (5.8 percent). Combustion processes are responsible for nearly all (about 97 percent) of the emissions of the main greenhouse gas CO_2; the main sources of methane are mining, the natural gas industry, agriculture and waste disposal.

Carbon dioxide emissions vary widely internationally: they range from an average of 0.6 t/person in low-income countries to an average of 12.3 t/person in high-income countries. The world average is 4.0 t/person.

Box 3.5. Carbon dioxide emissions per capita, international comparison, 1996



Source: OECD

Note: Aggregated CO_2eq emissions were calculated using the updated global warming potential values given by IPCC/UN FCCC

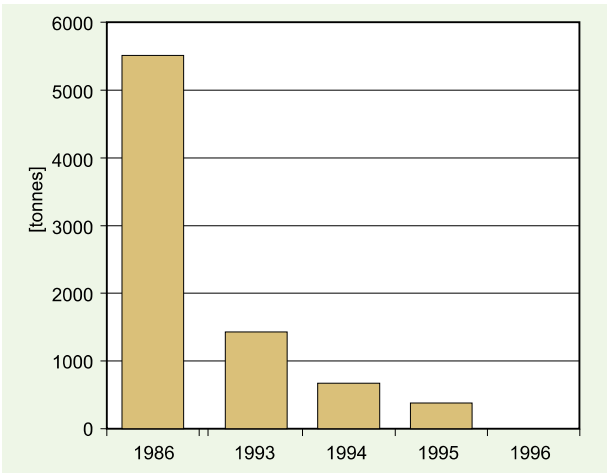
Protection of the ozone layer

The Czech Republic has adopted strong legislation to restrict the general use of the most important ozone depleting substances (ODS). The key international agreement to phase out ozone-depleting chemicals (chlorofluorocarbons - CFCs, halons and others) is the Montreal Protocol, which the Czech Republic acceded to in January 1993. The Czech Republic has fulfilled its international commitments under the Protocol and its amendments and has reduced CFC consumption from 5,514 tonnes in 1986 (when CFCs were commonly used as coolants, foaming agents, fire extinguishers

and solvents) to only 8 tonnes in 1999 (when they were used only for the special purposes permitted under international law).

The production and import of halons and CFC compounds for common use has been forbidden in the Czech Republic since 1996, and production of HCFC compounds since 1997. Unfortunately, problems remain with the collection, recycling and disposal of used products containing ozone depleting substances.

Box 3.6. Consumption of substances controlled by the Montreal Protocol for common use in the Czech Republic, 1986-96



Source: Ministry of Environment

Note: Data refer to the substances listed in Annex A, Group I (compounds CFC-11, 12, 113, 114 and 115 - the so called 'hard freons')

Total consumption of CFCs in the EU in 1986 was seven times higher than in the Accession Countries, but by 1996 this difference had fallen to approximately a factor of two. Production of CFCs in the major developed countries had declined by 1996 to about 7 percent of its maximum level at the end of the 1980s as a result of international regulations. The amount of CFCs produced in the EU decreased from 442.6 thousand tonnes in 1986 to 33 thousand tonnes in 1996, whilst production of halons decreased from 13.78 thousand tonnes to 0.

Water quality

Rivers in the Czech Republic drain the country to the North, Black and Baltic Seas: 63 percent of the country's territory is in the Labe (Elbe) basin, 30 percent in the Morava/Dyje basin and 7 percent in the Odra (Oder) basin. Since 1991, water quality category V, for very highly polluted water, has been eliminated in the country's main rivers as well as in a number of their important tributaries (for most of the length of rivers Bílina, Teplický potok, Jihlava and Lužnice).

Water quality in the Czech Republic's main rivers has improved significantly in relation to organic pollution as a result of the construction of new or extended wastewater treatment plants. Between 1990 and 1999 there was a decrease in discharged pollution as measured by the following parameters:

- biological oxygen demand (BOD_5): 85 percent;
- chemical oxygen demand (COD_{Cr}): 78 percent;
- suspended substances: 84 percent;
- dissolved inorganic salts: 37 percent;
- petroleum products: 89 percent and
- apparent acidity and alkalinity: 81 percent.

A further decrease in pollution from point sources is expected in connection with the construction of more wastewater treatment plants (especially in municipalities with 2,000-10,000 population equivalent) during the period 2000-03. Problems remain however in the form of high nitrate concentrations, and in minor water courses also as a result of ammoniacal nitrogen and microbial pollution.

Parallel to the decrease in pollution from point sources (municipal wastewater treatment plant, industrial plants etc.), the impact of diffuse pollution sources (especially agriculture) on surface water quality is of increasing importance. Compared to other countries, this type of pollution has remained high in the Czech Republic. It is however expected that the process of implementing EU legislation will result in a gradual decrease in water pollution from non-point sources, especially pollution by nitrates from agricultural sources.