Zpráva o životním prostředí České republiky v roce 2007

CENIA, česká informační agentura životního prostředí
2008

Dostupný z `http://www.nusl.cz/ntk/nusl-295622`

2007

REPORT ON THE ENVIRONMENT
OF THE CZECH REPUBLIC

cenia

Ministerstvo životního prostředí
České republiky

2007

REPORT ON THE ENVIRONMENT OF THE CZECH REPUBLIC

cenia

Each year, the Ministry of the Environment presents a report on the state of the environment over the past year and on factors that influence the state to the Government of the Czech Republic. The report is prepared by CENIA, the Czech Environmental Information Agency. The 2007 report was reviewed and approved by the Government on 15 October 2008 and both chambers of the Parliament of the Czech Republic were subsequently notified. Pursuant to Act No.123/1998 Sb., on the right to information on the environment, the report is also published in electronic form (www.mzp.cz, www.cenia.cz) and distributed.

An evaluation of the state and the development of the Czech Republic's environment in 2007 shows that after the **previous stagnation of 2005–2006, the state of the environment has been improving**. The decline in air and water quality seen over the preceding two years was merely a temporary fluctuation and does not indicate the reversal of the long-term positive trend in the development of the environment. However, it is notable that the **principal problems of and threats to the future development that had been identified in previous years are of increasing significance and urgency**. These include **growing greenhouse gas emissions, the large proportion of air emissions from pollution sources that are difficult to regulate** (transport and household heating) and **the dynamic development of road transportation** with its associated adverse environmental effects.

The main negative conclusions of the report and threats to future development:

Following the steep decline of the early 1990s that ensured compliance with the commitments under the Kyoto Protocol, **greenhouse gas emissions have not decreased any further**, and even have displayed a **moderate increase** in recent years. In addition, **emissions from mobile sources are also increasing**, reaching 13 % of the total emissions in 2006. Specific greenhouse gas emissions in the Czech Republic are amongst the highest in Europe.

Transportation is one of the main air polluters and its effect on air quality keeps growing. According to NFR classification, road transportation (that is responsible for almost all pollution from transportation) accounted for 32 % of NO_x, 23 % of VOC, 33 % of PM_{10} and 46 % of $PM_{2.5}$ emissions in 2006.

A significant proportion of **suspended particles** is produced by **household heating** (30 % of PM_{10} and 23 % of $PM_{2.5}$).

Transportation performance in passenger transportation has been increasing, while the **performance in private automobile transportation** keeps increasing. The number of registered passenger vehicles has increased by 4 % and trucks by 14 %. The high age of the vehicle fleet poses complications for reducing emissions from transportation. Freight road transportation is a major component of transportation performance within freight transportation (72 %), while its environmental impact is the highest of all modes of freight transportation.

In most of the Czech Republic, **limit values for ground-level ozone have been exceeded**, which poses a risk to both human health and ecosystems.

The fuel composition of the primary energy basis has stabilised, having a high proportion of solid fuels. The use of solid fuels for household heating is declining very slowly.

Despite a moderate annual increase, **the proportion of renewable energy sources (RES) in the consumption of primary energy sources (PES) does not make it likely for the State Environment Policy's objectives to be met within the given time horizon** (a 6 % proportion of RES in PES consumption by 2010). The proportion of RES in gross domestic electricity consumption decreased from 4.9 % in 2006 to 4.7 % in 2007.

The health condition of the Czech Republic's forests as determined by the level of defoliation of coniferous trees older than 60 years is amongst the highest in Europe.

According to preliminary results, **waste production has shown an annual increase**, with an ever increasing proportion of waste being landfilled.

Preliminary data indicates that **a persistently high proportion of municipal waste continues to be landfilled**.

The incidence of allergies in children is on the rise, especially within the pre-school age group.

The main positive conclusions of the report:

Air quality in the Czech Republic has displayed a year-to-year improvement; the area with poor air quality with respect to human health has decreased from 29 % of the Czech Republic in 2006 to 6.3 % in 2007. However, these areas house more than 32 % of the Czech population. In addition, this improvement also resulted from the favourable meteorological conditions during 2007. The Moravian-Silesian Region remains problematic from the viewpoint of air quality.

Water pollution from point sources has been **decreasing**; a decrease in water pollution with organic substances in 2006 was not confirmed in 2007.

According to the current analysis, **running water quality** has improved. This result was influenced by methodological changes in monitoring.

The State Environment Policy's objective in the area of providing the population with drinking water has been accomplished, with 92 % of the Czech Republic's population being connected to water supply systems. At the same time, water losses within the piping systems have decreased.

The economy's energy intensity continues to sharply increase as it has since 2005, i.e. at an annual rate of approximately 6 %.

The performance of freight rail transportation has shown an annual increase of 3.3 %, which, considering the moderate decline in total freight transportation volumes, indicates that the most environmentally harmful freight road transportation is no longer increasing.

The proportion of permanent grasslands and forests has increased at the expense of arable land.

There is a continuing **development of organic agriculture**, i.e. with respect to both an increase of organically farmed land and the number of organic farms.

The species composition of forests contains growing proportions of deciduous woody species.

Since 2003, when non-capital expenditures started to be monitored in addition to capital expenditures, we have witnessed a growing trend in the amount of the total expenditure on environmental protection, both in absolute terms and as a proportion of GDP. **In 2006, it reached CZK 63.5 billion, i.e. 2 % of GDP**.

The climate change

In spite of achieving the obligations under the Kyoto Protocol, the development of greenhouse gas production can considered unfavourable, especially from the perspective of their increase from transportation. In comparison with the EU15 and the EU25 averages, specific per-capita emissions remain high.

Even though the Czech Republic has already fulfilled its commitments under the Kyoto Protocol for the 2008–2012 period (emissions dropped by 23.7 % between 1990 and 2006, while the commitment is only 8 %), the current trend in greenhouse gas emissions is unfavourable. Total emissions (including both the emissions and the sharp decline within the LULUCF sector) reached 144.8 Mt of CO_2 eq in 2006, which represents an annual increase of nearly 4 %. Preliminary estimates for 2007 confirm the trend's continued growth.

The main reason is increasing greenhouse gas emissions from mobile sources. For most other monitored categories of sources, emissions have either decreased or stagnated (Chart 1). The share of mobile sources in greenhouse gas emissions increased from 4.7 % in 1990 to 13 % in 2006, with the majority of the emissions originating from road transportation. This makes mobile sources the second most significant source of greenhouse gases, second only to fuel combustion in stationary sources.

The Czech Republic's specific greenhouse gas emissions at 14.5 tonnes of CO_2 eq per capita are amongst the highest in Europe (the EU27 average being 10.4 tonnes of CO_2 eq). This is a result of the persistently high proportion of energy intensive production, the high proportion of solid fuel use in electricity and heat generation and the relatively low proportion (34.8 %) of nuclear power stations and renewable sources of energy.

According to preliminary 2007 estimates, the production of the most significant greenhouse gasses has increased. Preliminary data put the annual increase at almost 4 % (6 Mt of CO_2 in absolute terms). The reason behind the increase in CO_2 emissions lies mainly in the area of energy generation (the public energy sector), within which an increase of almost 4 Mt of CO_2 was detected in 2007. The rest of the increase in CO_2 emissions is due to transportation and industrial production.

The development of greenhouse gas emissions by sector in 1990–2006 [Index (year 1990=100)]

The proportion of each sector in total greenhouse gas emissions in 2006 [%]

2.3 %
5.2 %
10.3 %
3.8 %
13 %
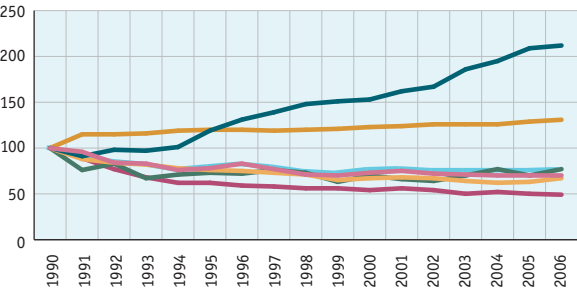
The energy sector stationary sources 65,4 %

38.4 %
8.1 %
18.8 %
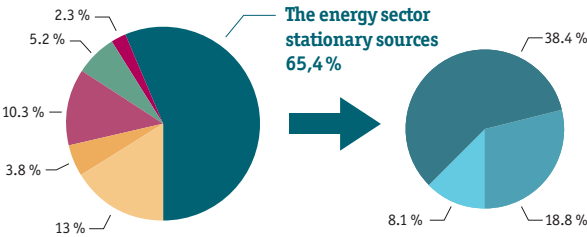
Data for 2007 are not yet available. Based on reporting requirements, they are submitted 15 months after the end of each calendar year. Data and commentaries are based on total emissions and do not include the sharp decline in emissions from the LULUCF sector (Land Use, Land Use Change and Forestry Activities).

Specific CO_2 eq emissions in the EU27 and other countries in 2006 [tonnes of CO_2 eq per capita]
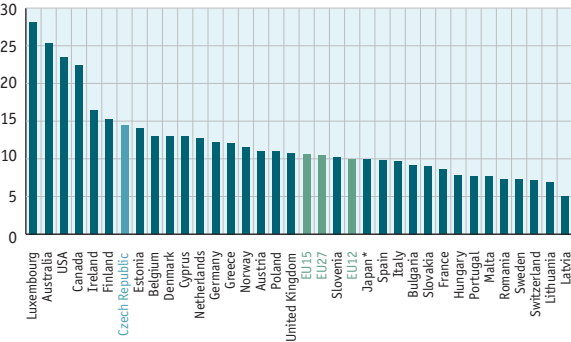
Air pollution and air quality

According to the 2007 evaluation, there have been no major changes. An increase in SO_2 and CO emissions has been detected. The emissions of other main pollutants (PM, NO_x, VOC and NH_3) have stagnated. In 2007, limits for human health protection were exceeded. While these areas represent 6.3 % of the Czech Republic, they house more than 32 % of the Czech population (in 2006, these areas represented 29 % of the Czech Republic). The positive development was due to meteorological conditions, which were more favourable for the dispersal of pollution into the air.

The increase in sulphur dioxide emissions has mainly resulted from changes in the intensity of the use of sources for generating electricity. Iron and steel production is linked with the increase in carbon monoxide emissions. The decrease in emissions from household heating (PM, SO_2, CO) has resulted from the rather moderate climatic conditions throughout 2007.

Air pollution with PM_{10} particles continues to exceed the limits, even though the measured concentrations of this pollutant have markedly decreased in comparison to previous years. In 2007, the limits for 24-hour PM_{10} concentrations was most significantly exceeded in the Moravian-Silesian Region (the Ostrava area), and to a lesser degree in the Olomouc, Central Bohemia, Ústí nad Labem and Southern Moravian Regions. The limits for the 24-hour average concentration were exceeded in 6.3 % of the country (in 2006 this was 29 %); the limit for the annual average concentration was exceeded in 0.7 % of the Czech Republic (in 2006, in 2.3 % of the territory). The areas where PM_{10} exceeded limits in 2007 house more than 32 % of the population (62 % in 2006). In connection with the improved emission situation of PM_{10}, the area with poor air quality for human health (i.e. the area where limits for human health protection have been exceeded for at least one pollutant) decreased from 29 % of the Czech Republic in 2006 to 6.3 % in 2007.

In 2007, 85 % of the Czech population (97 % of the Czech Republic) was exposed to ground-level ozone concentrations exceeding the target values for human health protection. The AOT40 ozone target value for the protection of ecosystems and vegetation continued to be exceeded in almost all of the Czech Republic in 2007, with the exception of some large areas in the Hradec Králové and the Pardubice Regions.

The target value for benzo[a]pyrene was exceeded in 4.9 % of the Czech Republic that houses 51 % of the population. The increasing transportation burden has translated into limit values being exceeded at heavily trafficked locations, including the tolerance limits for NO_2.

The evaluations thus far indicate that the benzene limit is repeatedly exceeded in Ostrava. The target value for the average annual concentrations of arsenic has yet again been exceeded in Ostrava and Kladno (Švermov, Stehelčeves) and, in 2007, also in Prague (Prague 5 – Řeporyje). In 2007, the target value for cadmium was exceeded in Tanvald.

The orientation of the 36 highest 24-hour PM$_{10}$ concentrations in the air in 2007
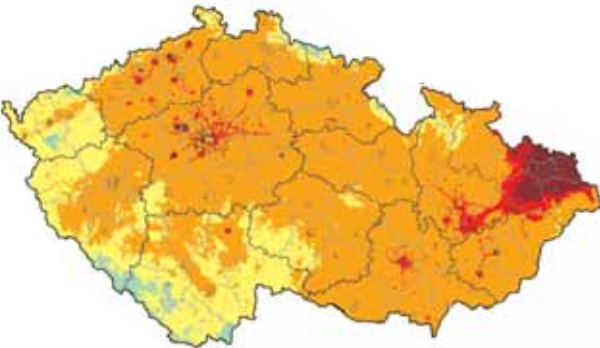
Classification of stations
- ■   Urban background
- ♦   Suburban background
- ▲   Rural
- ●   Transportation
- ★   Industrial
- ——— Regions

Concentrations [µg/m³]

≤ 20	≤ LAT	2,3 % ground
20–30	LAT–UAT	20,9 % ground
30–50	UAT–LV	70,5 % ground
50–60	LV–60	4,0 % ground
> 60	> 60	2,3 % ground

Source: Czech Hydrometeorological Institute

The orientation of the annual average benzo[a]pyrene concentrations in the air in 2007
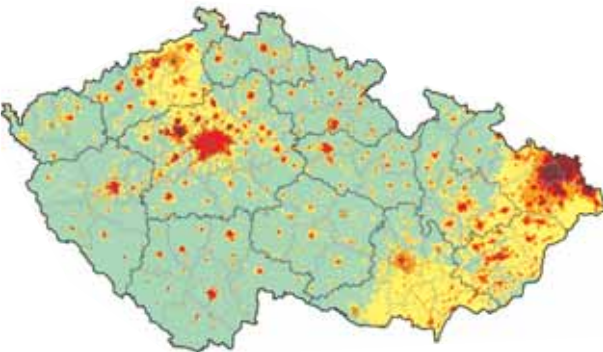
Classification of stations
- ■   Urban background
- ♦   Suburban background
- ▲   Rural
- ●   Transportation
- ★   Industrial
- ——— Regions

Concentrations [ng/m³]

≤ 0,4	≤ LAT	66,8 % ground
0.4–0.6	LAT–UAT	21,9 % ground
0.6–1.0	UAT–LV	6,4 % ground
1.0–2.0	LV–2	3,9 % ground
> 2.0	> 2	1,0 % ground

Source: Czech Hydrometeorological Institute

LAT – the lower assessment threshold – if the pollutant´s concentration is below this level, it does not have to be measured and only modelling or an expert assessment is sufficient.
UAT – the upper assessment threshold – if the pollutant´s concentration is above this level, measuring is obligatory.
If the concentration ranges between the UAT and the LAT, the above methods can be combined.
LV – limit value

Water and water managment

Discharged pollution has decreased in all stated basic indicators and has contributed to the improvement in surface water quality. While the drinking water supply in the Czech Republic is adequate, water losses within the piping system are, despite some improvements, still relatively high (18.5 %). Almost 20 % of the population is not connected to sewer systems and 4 % of all wastewater from sewer systems is not treated. The construction and modernisation of waste water treatment plants (WWTPs) is continuing.

In 2007, discharged pollution corresponded in a reduction of produced pollution in all basic indicators. The 2005–2006 year-to-year increase for COD_{Cr}, undissolved substances and disolved inorganic salts was not confirmed. With the continuing decline in pollution from point sources, the significance of the influence of area pollution on surface water and groundwater quality is increasing – especially with respect to pollution of nitrates from nitrogen fertilizers. In 2007, the continuing excessive supply of nutrients leeching into surface water yet again led to water eutrophication in many water reservoirs.

An evaluation of running surface water quality in 2007 was influenced by changes in the standard limits and the monitoring system. Within the evaluation of the monitored water quality measurement profiles, in the group A was indicator AOX the worst. Group D showed high and very high pollution, especially due to the inclusion of chlorophyll. According to the indicators for pollutant groups B and C, most watercourses are polluted or only mildly polluted. The most polluted watercourses are mainly smaller watercourses with lower water-levels and for larger watercourses, include Bílina and lower Lužnice and Ostravice.

The Czech Republic managed to fulfil the State Environment Policy's objective of ensuring that 91 % of the population was supplied with quality drinking water by 2010 as early as 2004; with 92.3 % of the Czech Republic's population being connected to water supply systems in 2007. Both the amount of produced water and that of wastewater discharged into sewer systems continues to moderately decline. Since 2000, there have been annual declines in drinking water losses within the pipeline network. These have decreased from 24.3 % to 18.5 %.

While the proportion of treated wastewater discharged into sewer systems peaked in 2007 at 95.8 %, this share has more or less stagnated at 94–96 % since 2000. 2007 saw the completion of seven WWTPs and the modernisation of 22 waste water treatment plants with a capacity of over 2 000 population equivalent. The long-term increase in the proportion of the population connected to sewer systems has continued. However, 19.2 % of the population is still not connected to sewer systems. By international comparison for 2001–2004, the overall proportion of the population whose wastewater is treated failed to reach the EU15 average. Southern European and post-communist countries are worse off, however.

Amounts of discharged pollution in 2000–2007
[Index (year 2000 = 100)]
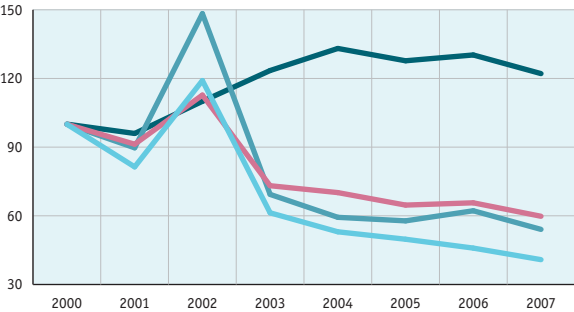
- BOD$_5$
- COD
- Undissolved substances
- Dissolved inorganic salts

Source: T. G. Masaryk Water Research Institute

Proportion of measuring profiles into quality categories according to indicator groups A–D in 2007 [%]
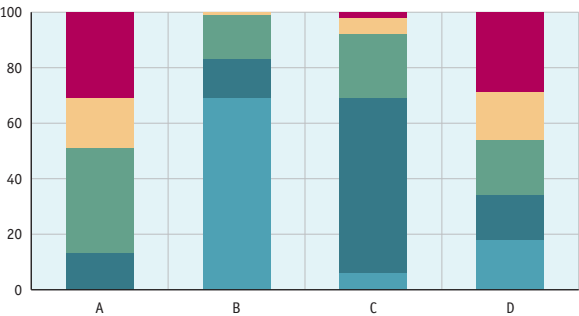
Classification of water quality according to ČSN 75 7221

- I   Unpolluted water
- II   Moderately polluted water
- III   Polluted water
- IV   Heavily polluted water
- V   Very heavily polluted water

Indicator groups
- A   General, physical and chemical indicators
- B   Specific organic compounds
- C   Metals and metalloids
- D   Microbiological and biological indicators

Source: Czech Hydrometeorological Institute

International comparison of the proportion of the population connected to waste water treatment plants by treatment stages, 2001–2004 average [%]
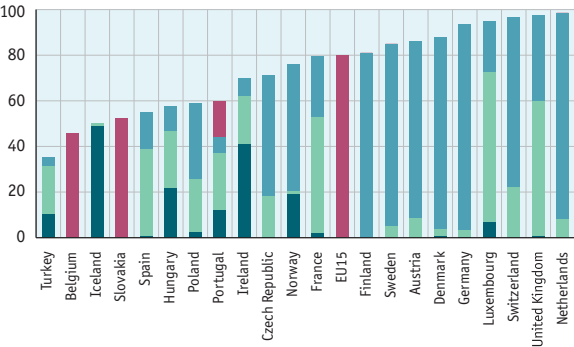
- Primary (mechanical) treatment
- Secondary (mechanical-biological) treatment
- Tertiary treatment (mechanical-biological with chemical removal of other substances)
- Treatment stage unidentified

Source: OECD

Nature and biodiversity

Despite its relatively small area, the Czech Republic is characterised by its considerable wealth of animal and plant species. Nature and its biodiversity are negatively affected by a number of human activities. From the long-term perspective, a decline in both ecosystem and species biodiversity has been observed. In order to reduce the decline in biodiversity, special emphasis is placed, i.e. within the Czech Republic, on preventing the spread of and eliminating some non-indigenous species, preservation programmes for selected species and declaring protected areas.

From the viewpoint of species diversity, more than half of the monitored plant and animal species are endangered or are declining, especially due to the improper agricultural use of the landscape. Transition areas keep disappearing from the landscape and the current intensive development of linear and industrial structures, including suburbanisation, leads to reduced openness of the landscape and its fragmentation. The strategic objective of both the EU and the State Environment Policy is to halt the decline of biodiversity by 2010. The gradual decline in biodiversity in the Czech Republic is illustrated by the number of species of wild birds that have been monitored since the 1980s. The Landscape Management Programme supports preventing the spread of and eliminating some non-indigenous species that pose strong competition to indigenous plants and animals and may transmit dangerous illness. In order to preserve endangered organisms, it is important to implement rescue and care programmes oriented towards selected species and the stabilisation of their population in the biotope. While no new rescue or preservation programme was adopted in 2007, the preparation of the existing ones continued.

An important and effective tool for halting the decline in biodiversity is declaring protected areas. In 2007, nine new small-scale specially protected areas were declared (two of which were in the national category) and five were abolished. There were no changes in the number of large-scale specially protected areas. Within general nature conservation, statistical monitoring indicated an increase in the number of protected trees, while no new national parks were established in 2007.

From the European nature conservation perspective, the Natura 2000 network of protected areas is of special significance. An important event in 2007 was the inclusion of the Sites of Community Importance (SCI) from the national lists of 2005 into the European lists. One new Special Protection Area (SPA) was approved by a government regulation in 2007, namely that of Heřmanský stav – Odra-Poolší, effective 1 June 2008. 17 new sites within the Pannonicum area were added to the national list of Sites of Community Importance, while one site was removed in 2007.

The index of the number of wild bird species in 1982–2006 [Index (year 2000 = 100)]
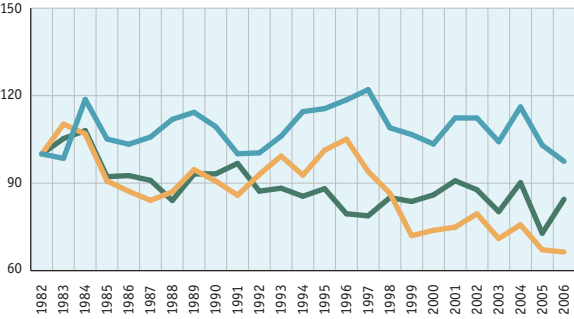
- Forest species
- Farmland species
- Common species

Source: Czech Society for Ornithology

Small-scale specially protected areas declared and abolished in 2007

Category	Declared	Abolished
National natural monument	Skalická Morávka Kopičácký rybník	Valašské muzeum v přírodě
Nature reserve	Nový rybník Svatomariánské údolí Spálava Rašeliniště u myslivny	Bludy Babylon Ponova louka
Natural monument	Svaté pole Píščina u Tuhaně Trkmanec – Rybníčky	U Černoblatské louky

Natura 2000 – Sites of Community Importance (SCI) within the Pannonicum area that are included in the national list, existing in 2006 and changes in 2007
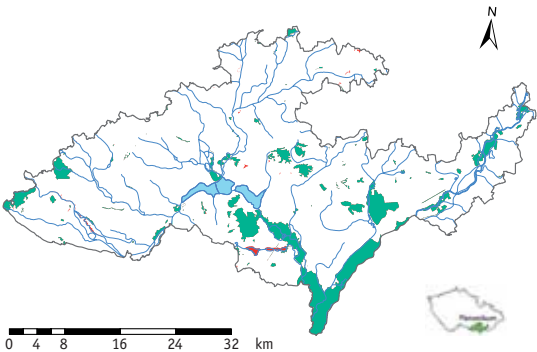
- SCI as of 31 December 2006
- SCI newly added to the national list
- Boundaries of the Pannonicum area
- Waters

Source: Agency for Nature Conservation and Landscape Protection of the Czech Republic

Forest, forestry and forest management

With respect to forest protection, 2007 was one of the least favourable in recent years. Due to the extensive damage caused by hurricane Kyrill, logging reached its historical maximum of 18 508 thousand m³ of raw wood. In most of the Czech Republic, bark beetle incidences increased, in some places to the point of calamity. Even though defoliation has slowed or even stagnated, the Czech Republic has one of the highest defoliation rates in Europe.

The area of forested land within the Czech Republic is very slowly increasing (by 0.07 % annually), reaching 2 651 thousand ha in 2007, i.e. 33.7 % of the country's total area. Within species composition, there has been a gradual increase in the proportion of deciduous woody species, vegetation is becoming increasingly mixed, spruce and pine are declining and there are increasing numbers of beeches, oaks, ashes and maples. Conifers make up 74.8 % of all vegetation, deciduous trees 24.2 % and clearings 1 %. The percentage of forested land within specially protected areas is stable, representing 28.4 % of the total forested area.

Of all air pollutants, the most significant stress factor for forest ecosystems is ground-level ozone, whose concentrations considerably exceeded the target values in most areas. 2007 was unfavourable mainly due to hurricane Kyrill, which translated in a two fold increase in salvage and incidental felling, which reached 15 million m³. The extent of damage caused by Kyrill amounted to almost 11 million m³ of wind-damaged wood. About 2.2 million m³ of wood was damaged by biotic factors, of which the volume of spruce infested by bark beetle was 1.8 million m³. Damage caused by pollutant emissions amounted to 39 thousand m³. The population of hoofed game has moderately increased which disturbs the natural renewal of forests and thus is not in line with the State Environment Policy's objective of achieving and subsequently maintaining a balance between forest ecosystems and game populations.

Even though defoliation has been slowing down or even stagnating in recent years, the Czech Republic, along with Luxembourg and Bulgaria, has the highest defoliation rate within the EU, with over 40 % of all trees having been damaged. Logging reached its historical peek in 2007. A total of 18 508 thousand m³ of raw wood was felled, including 17 278 thousand m³ of coniferous wood and 1 230 thousand m³ of deciduous wood. The area of restored forest vegetation has decreased by 305 ha annually, largely due to increasingly successful afforestation. The proportion of natural renewal has moderately declined to 2 953 ha in connection with the higher share of the renewal of areas created as a result of incidental felling. Artificial renewal totalled 18 304 ha. One of the most effective market instruments supporting the principles of sustainable management in forests is forest certification. The area of certified forests is 1 874 305 ha (i.e. 70.7 % of forests) according to the PEFC system and to 16 951 ha (i.e. 0.64 % of forests) according to the FSC system, which is in line with the State Environment Policy's objective of supporting the certification process within the PEFC system.

Note:
The Pan European Forest Certification Council (PEFCC) is a certification system certifying that forests are managed in accordance with sustainable management principles.

The species composition of forests in 2007 [%]

Chart 8

■	Spruce	52,8%
■	Fir	0,9%
■	Pine	17,1%
■	Larch	3,9%
■	Other coniferous	0,2%
■	Oak	6,7%
■	Beech	6,9%
■	Birch	2,8%
■	Alder	1,5%
■	Other deciduous	6,3%
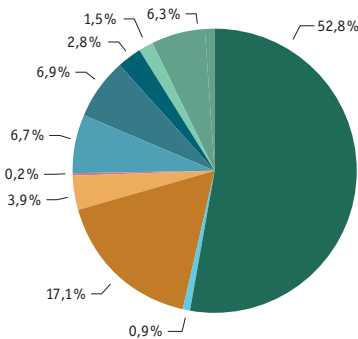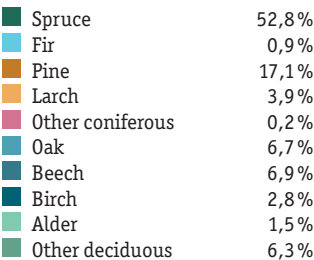
Source: Forest Management Institute

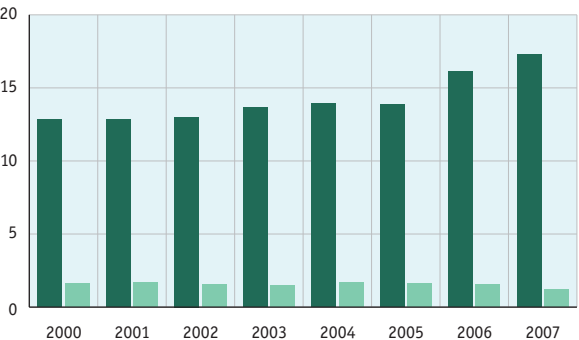**Logging from 2000–2007 [mil. m³]**

Chart 9

■ Coniferous
■ Deciduous

Source: Czech Statistical Office

The trend of the renewal of coniferous and deciduous woody plants in 1990–2007 [mil. m³]
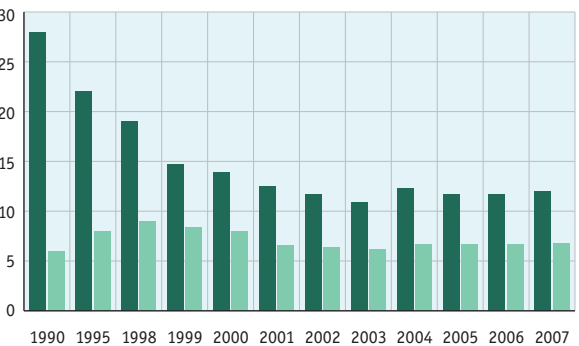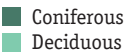
Chart 10

■ Coniferous
■ Deciduous

Source: Czech Statistical Office
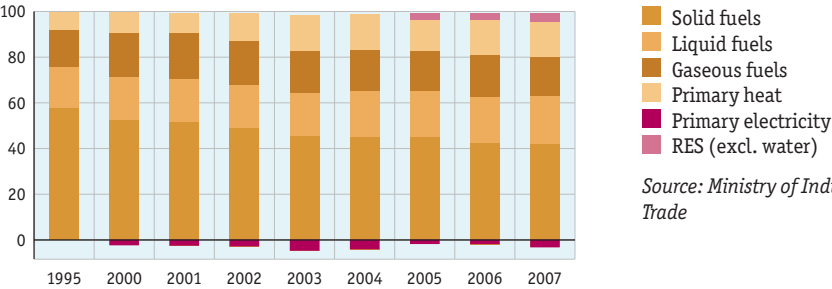
The energy sector

In 2007, the energy intensity expressed as the specific consumption of primary energy sources per GDP unit reached its second largest year-to-year decrease since 2000. The objective of both the State Environmental Policy and the State Energy Policy, i.e. to decrease energy intensity, was accomplished. The level of consumption of primary energy sources has stabilised. However, as regards the composition of primary energy sources (PES), there has been no additional decrease in the proportion of solid fuels in total PES consumption in favour of gaseous fuels, which is not favourable from the environmental perspective. The reason why using domestic energy sources (coal) is preferred to imported natural gas lies in its consistently rising price.

While the annual rates of the decline in energy intensity have been unstable and fluctuating, especially between 2000 and 2003, energy intensity has been significantly declining since 2004, although it is still about 45 % higher compared to developed EU countries. For the most part, the situation is the result of the traditional orientation of the economy towards industry and other energy intensive economic sectors, and partly also because of the higher percentage of solid fuels in PES consumption (45 %, i.e. 859.6 PJ) and the lower energy efficiency in the area of energy transformation.

In 2007, according to preliminary data, the economy's energy efficiency displayed an annual decrease of 5.9 %, which is the second most significant decrease next to 2006, when a decrease of 6.5 % was achieved. Increasing energy efficiency is the most significant way to reduce the demand for energy, the emissions of pollutants into the environment, the rate at which our export dependency increases and to improve the competitiveness of both the energy sector and the entire economy.

Preliminary data indicates that emissions from fuel combustion within electricity and heat generation only decreased with respect to particulate matter (to 24.4 thousand t) in 2007. For SO_2 and NO_x emissions, there was a moderate increase (to 216.4 thousand t SO_2 and 152.2 thousand t NO_x). The increased amount of emissions is associated with the 4.6 % increase in electricity generation.

The development of the proportion of individual primary energy sources in 1995–2007

Chart 11

- Solid fuels
- Liquid fuels
- Gaseous fuels
- Primary heat
- Primary electricity
- RES (excl. water)

Source: Ministry of Industry and Trade

Primary energy sources include all domestic and imported energy sources. Primary heat means heat generated in nuclear reactors, geothermal and solar heat. Primary electricity includes electricity generated in water, wind and photovoltaic power plants plus electricity import and export balances. Gaseous fuels are recalculated to PJ units through the calorific value.

The development of the energy intensity of the economy from 1995–2007 [Index (year 1995 = 100)]

Chart 12

- Gross domestic product at constant 2000 prices
- Total consumption of primary energy sources (PES)
- Total energy intensity
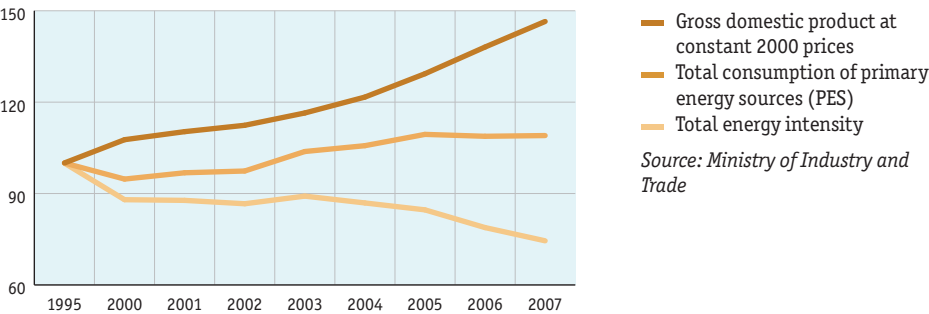
Source: Ministry of Industry and Trade

Renewable energy sources

In 2007, the development in the production of electricity and heat energy from individual renewable energy sources (RES) continued in a differentiated manner. While gross electricity generation from biomass increased by one-third compared to 2006, there was a decrease in gross electricity generation from hydroelectric plants due to climatic conditions. The proportion of renewable energy sources in the total consumption of primary energy sources (PES) increased.

Preliminary data indicates that in 2007, the proportion of RES in total PES consumption moderately increased, reaching approximately 4.3%. PES consumption totalled 77.7 PJ in 2007 and reached 80.79 PJ in 2007. This development does not make it likely for the State Environment Policy's objective of achieving a 6% share of RES in PES by 2010 to be accomplished.
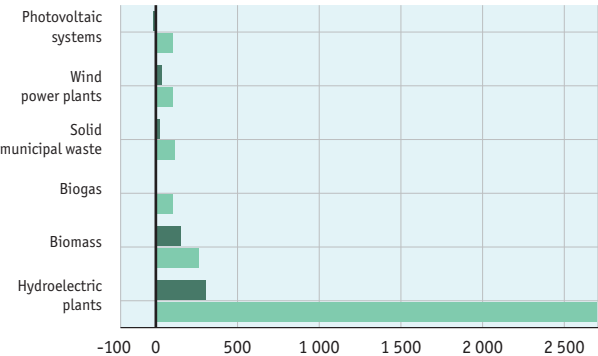
The proportion of gross electricity generation from RES in gross domestic electricity consumption was 4.7%. In 2007, gross electricity generation from RES accounted for approximately 3.8% of gross domestic electricity generation, reaching 3.4 TWh. In both cases, this was less than in 2006, when a 4.9% proportion in consumption, i.e. 4.2% proportion in generation was achieved. The decline, which was caused by lower production in hydroelectric plants, shows a strong correlation between energy generation from RES and energy generation from these power plants.

In contrast to the decrease in the production at hydroelectric plants, there was a considerable annual increase in electricity generation from all other types of RES. Significantly higher was electricity generation from biomass, which grew by a third in 2007, reaching approximately 970 GWh.

The production of heat energy is the area where RES can be best utilised. The majority of heat produced from RES is utilised in households, where it involves the combustion of wood and wood waste from local sources. According to preliminary data, total gross heat energy production reached 48 750 TJ in 2007, of which approximately 29 500 TJ was generated through biomass combustion in households.

Until now, indicators of the proportion of RES at the EU level have most often been expressed as the proportion of gross domestic electricity production from RES in gross electricity consumption (the Czech Republic's target for 2010 being 8%), or possibly as the proportion of energy from RES in total PES consumption. Within the newly proposed European Directive on the promotion of RES, the European Commission has specified targets for Member States expressed as proportions of the final consumption of energy from RES in final energy consumption. The Czech Republic's target for 2020 has been set at 13%. Increasing the proportion of energy produced from RES is an important tool for minimising the energy sector's negative environmental effects.

Annual changes in installed capacity and electricity generation (2006/2007)

Photovoltaic systems
Wind power plants
Solid municipal waste
Biogas
Biomass
Hydroelectric plants

-100   0   500   1 000   1 500   2 000   2 500

The structure of total gross electricity generation from RES (renewable energy sources) in 2007
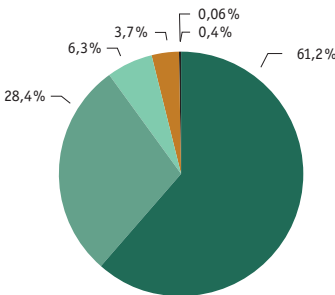
0,06 %
0,4 %
3,7 %
6,3 %
28,4 %
61,2 %

International comparison of RES utilisation in gross electricity consumption

Australia, Sweden, Latvia, Portugal, Slovenia, Finland, Slovakia, Spain, Denmark, Italy, France, Greece, Ireland, Germany, United Kingdom, Netherlands, Czech Republic, Poland, Lithuania, Belgium, Cyprus, Luxembourg, Estonia, Malta, Hungary, EU
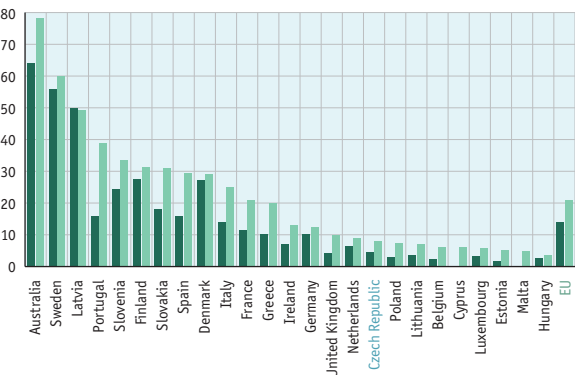
Transportation

The development of transportation remains environmentally unfavourable, although the structural changes in freight transportation has taken a positive turn. There has been a continuous increase in the performance of passenger automobile and air transportation, while the dominant freight road transportation, i.e. its performance, has not grown any and, in fact, has displayed a slight annual decrease. A positive finding is the 3.3 % annual increase in the performance of freight railway transportation.

There were marked annual increases in the number of both registered passenger cars (4.2 %) and registered trucks (14.2 %), which, in combination with the high age of the vehicle fleet (about 14 years for passenger cars), indicates a growing environmental burden from transportation. Although the number of alternative fuel vehicles has rapidly increased, their proportion in the vehicle fleet remains very small.

Both the additional 4.3 % increase in energy consumption within transportation, reaching a total of 260 911 TJ, and the results of the transportation emission balance show that both the volumes and structure of passenger and freight transportation has continued to develop in favour of the emission intensive modes. The share of transportation in air pollution continues to increase. In 2007, transportation accounted for 34 % of particulate matter emissions including tyre wear and secondary pollution (i.e. pollution that had already been emitted being stirred up), 46 % of CO emissions, 34 % of NO_x emissions and 13 % of greenhouse gas emissions. Preliminary data for 2007 indicates that in comparison to 2006, CO emissions decreased by 4.9 % to 202 714 t, NO_x emissions by 6 % to 93 196 t and VOC emissions by 4.9 % to 40 171 t. On the contrary, SO_2 emissions increased by 5.5 % to 666 t, CO_2 emissions by 4.4 % to 19.3 million t, N_2O emissions by 5.7 % to 2 652 t and PM emissions by 0.3 % in 2007. Transportation is the fundamental cause of the unfavourable development of total greenhouse gas emissions and air pollution with ground-level ozone exceeding local concentration limits in most of the country during the summer.

The development of the performance of private passenger transportation in 1989–2007 [Index (year 1989 = 100)]
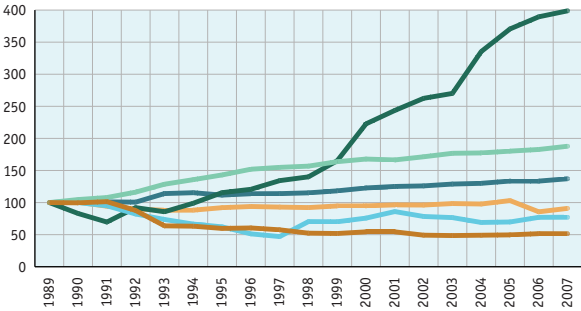
Chart 16

- **Air**
- **Road individual automobile transportation**
- **Total**
- **Municipal public transportation**
- **Public road**
- **Railway**

Source: Transport Research Centre, Ministry of Transport (Municipal public transportation 2007), Czech Statistical Office

Public road = index 2005/1990

The development of freight transportation volumes from 1990–2007 [millions tkm]
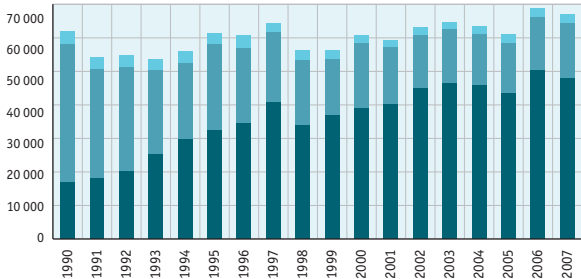
Chart 17

- **Other**
- **Railway**
- **Road**

Source: Transport Research Centre

The development of emissions from transportation in 1990–2007 [Index (year 1990 = 100)]
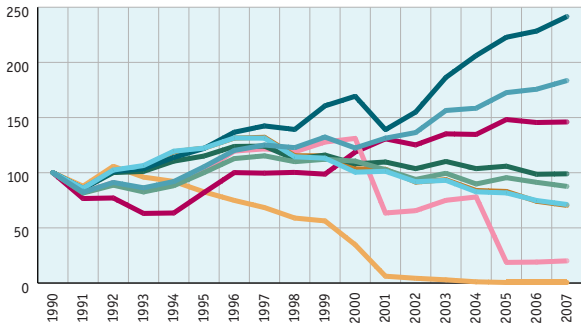
Chart 18

- CO_2
- CO
- NO_x
- N_2O
- CH_4
- VOC
- SO_2
- PM
- Pb

Source: Transport Research Centre

Between 2005 and 2007, a methodological change to the data basis was performed including a recalculation of data retroactive to 2000. As a result, not all data within the longer time series is fully comparable

Land use, soil and agriculture

With respect to land use, there have been growing proportions of permanent grasslands, water surfaces and forested land, but also of developed and other areas. Soil continues to be burdened by the application of mineral and lime fertilizers and of substances used for plant protection, which have seen an annual increase. Positive trends in agriculture are the growing number of organic farms, an increase in producers of organic food and the area of organically farmed agricultural land.

In 2007, the Czech Republic had 7 887 thousand ha, of which 53.9 % was agricultural land, 33.7 % was forested land, about 2 % were developed areas with courtyards, another 2 % were water surfaces, while the rest were other areas. Even though the area of agricultural land has been gradually decreasing, there still is a high proportion of ploughed land, which exceeds 38 % of the Czech Republic.

During the 2004–2007 period, agricultural production reached a record high level at constant prices, with a major contribution from crop production.

Although the application of net nutrients supplied to the soil through mineral fertilizers increased by 10.6 % annually (reaching 109.1 kg/ha), it is at the EU average level. The application of calcareous materials doubled to 230 thousand t and the total application of substances used for plant protection grew by 8.6 % to 10.8 million kg, l (the units correspond to the types of substances). The State Environment Policy's objective to reduce the use of dangerous pesticides and biocides and to replace them with less dangerous substances has failed to be accomplished.

Agriculture is the most significant producer of ammonia and is responsible for 95 % of its emissions. In 2007, total NH_3 emissions from agriculture reached 60.14 kt.

The positive trend in the development of organic agriculture continued in 2007. There were a total of 1 318 registered organic farms (an annual increase of 355 farms) and 253 organic food producers (an annual increase of 101 businesses). The area of organically farmed land was 312 890 ha (31 355 ha more than in 2006), which represented 7.36 % of all agricultural land. The State Environment Policy's objective of increasing the share of agricultural land resources where organic farming is performed to at least 6 % by 2005 and to at least 10 % by 2010 is therefore being achieved.

The obligation to add a bio-component to fuels has been in place since 1 September 2007, which resulted in a 15.5 % annual increase in the area used for rapeseed oil production.

The use of the Czech Republic's land in 2000–2007
[Index (year 2000 = 100)]
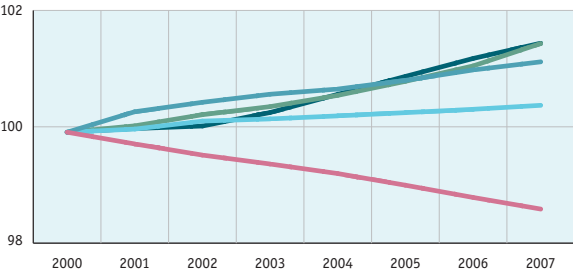
Chart 19

— Arable land, vineyards, hop gardense
— Permanent grasslands, orchards, gardensy
— Forest land
— Water surfaces
— Developed and other areas

Source: Czech Office for Surveying, Mapping and Cadastre

The use of substances for plant protection according to categories in 2000–2007 [thousands kg, litres]
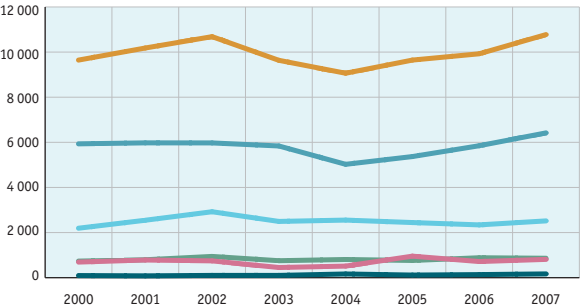
Chart 20

— Zooicides, dressings
— Herbicides and desiccants
— Fungicides, dressings
— Growth regulators
— Other
— Total

Source: Ministry of Agriculture

The development of organic farming in the Czech Republic in 1990–2007

Chart 21

number/thousands hectares   %
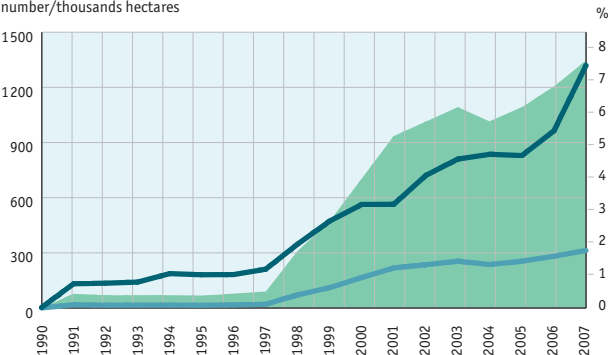
▭ Proportion in the agricultural land fund (the axis on the right)
— The number of organic farms (the axis on the left)
— The area of organically farmed agricultural land (the axis on the left)

Source: Ministry of Agriculture

Waste management

One persisting problem in waste management in the Czech Republic is biologically degradable waste, which forms a significant portion of mixed municipal waste a is landfilled with zero utilisation.

Despite strong economic growth, the Czech Republic has succeeded in reducing total waste production on a year-to-year basis, especially in the area of hazardous waste. In global, it is safe to conclude that especially the area of waste processing has been developing successfully, and the adverse environmental impact of waste production has thus been decreasing.

The amount of produced waste that is used for material recovery keeps increasing on a year-to year basis, which reduces the consumption of primary raw materials. The proportion of municipal waste that can be used for material recovery also increases, with many municipalities extending and optimising their systems for the separate collection of usable commodities, most commonly glass, paper and plastic.

The yield of sorted municipal waste increased by 13.4 % in comparison to 2006 (excluding metals), reaching the level of 48.72 kg per capita per year (paper, plastic, glass, drink boxes – 31.79 kg per capita per year). In 2007, a citizen had to overcome an average distance of 138 m to reach a container for sorted waste. This distance decreased by as much as 19 % in comparison to 2006.

One problematic area that will require careful attention of the responsible authorities are products from waste. The best available techniques for these products are not always clearly defined and not always are there binding limits for the occurrence of substances that are harmful to human health and the environment.

A new legal framework for waste management is being prepared for the coming period, which will take account of the requirements of the new Waste Framework Directive adopted by the European Community.

Total packaging waste created within the EKO-KOM system in 2007 amounted to 904 084 tonnes. In 2007, a total of 585 911 tonnes of waste was utilised within the EKO-KOM system, i.e. a recycling and utilisation rate of 68.11 % was achieved.

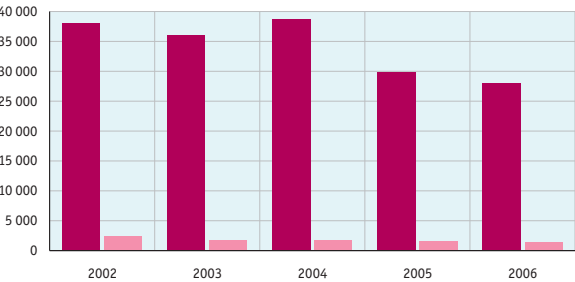**Waste production according to waste categories in 2002–2006 [thousands tonnes]**

Total waste production
Of that, hazardous waste

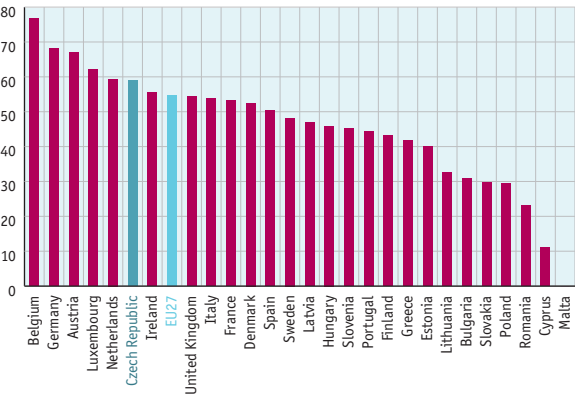**The rate of packaging waste recycling in the EU and recycling in 2005 [%]**

Recycling and utilisation rate of packaging waste in 2007 [%]
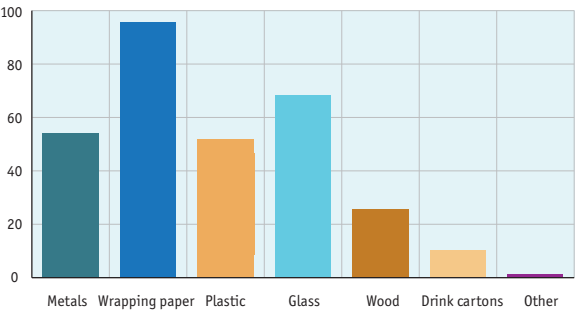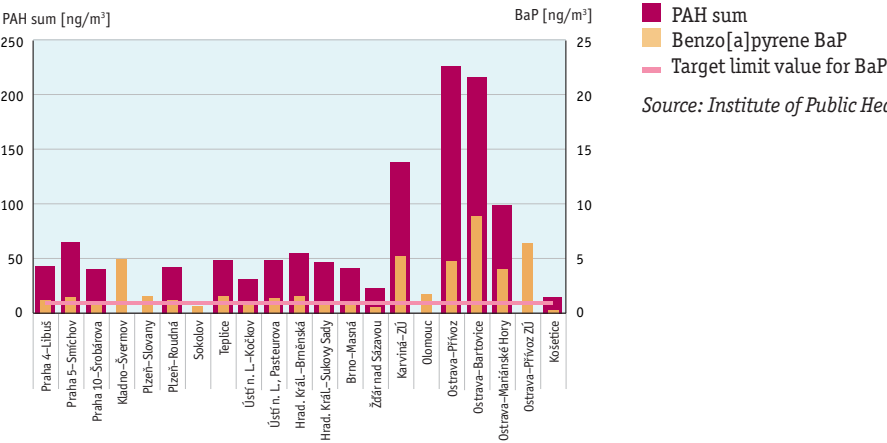
Health and the environment

One of the factors that significantly affects human health is the quality of the environment. Health risks ensuing from a polluted environment are mainly associated with air and water quality, noise and foreign substances in food.

The most significant air pollutants affecting human health include, above all, suspended particles, nitrogen dioxide and polycyclic aromatic hydrocarbons. Based on the concentrations of suspended particles of the PM10 fraction measured in 2007 in the urban environment, it can be estimated that air pollution from these pollutants may be increasing the overall mortality by 2.4%. Health problems associated with air pollution with nitrogen dioxide are to be expected in areas with intensive transportation. In locations with the highest PAH concentrations, estimates put the increase in the incidence of tumours at almost one case per 1000 inhabitants. A rise in allergies has been confirmed, which is now being diagnosed in 32% of all children. 258 800 (2.5%) of the people living in the Czech Republic are currently exposed to all day noise.
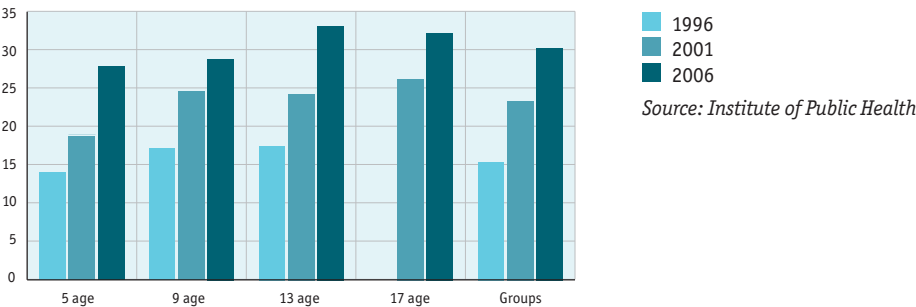
Organic compounds within the POP group that are banned by the Stockholm Convention and that are present in foods did not reach exposure levels representing a health risk (non carcinogenic effects). The degree of exposure calculated based on a study of individual food consumption reached its highest level for polychlorinated biphenyls, namely approximately 3% of the allowable daily intake. The average chronic exposure to inorganic substances did not exceed exposure limits for non-carcinogenic effect.

Most water supplied from public water supply systems is not harmful to health. The most problematic substances seem to include nitrates (the limit value was exceeded in 4% of the cases) and chloroform (the elicit value was exceeded in 3% of the cases). In 2007, no case was detected or reported involving an infectious disease that would be proven to have been transmitted through drinking water from a public water supply system. On the other hand, for 43 thousand people that are mostly supplied through the smallest water supply systems at least one indicator was found to exceed its limit value. Microbiological indicators of the quality of drinking water from wells were relatively frequently found to exceed their limit values. In the case of impaired bathing water quality, the number of locations failing to meet the limit values for microbiological indicators and blue-green algae increases. However, no epidemic incidence of infectious disease or health damage resulting from exposure to blue-green algae has been reported or recorded.
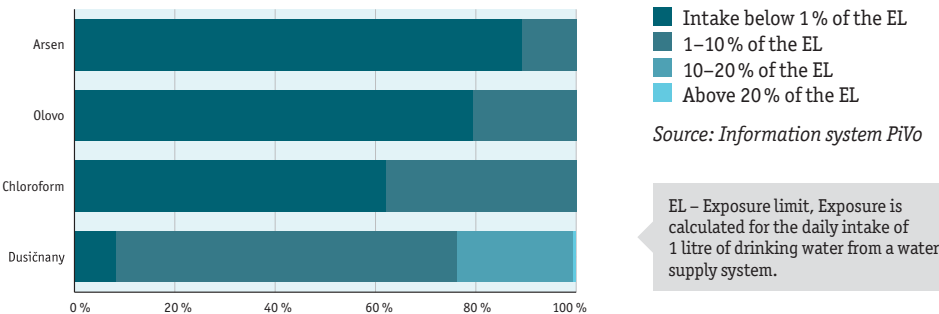
Concentrations of polycyclic aromatic hydrocarbons (the PAH sum) and benzo[a]pyrene at measuring stations, the annual arithmetic mean in 2007

PAH sum [ng/m³]

BaP [ng/m³]

Legend:
- PAH sum
- Benzo[a]pyrene BaP
- Target limit value for BaP

Source: Institute of Public Health

Stations: Praha 4–Libuš, Praha 5–Smíchov, Praha 10–Šrobárova, Kladno–Švermov, Plzeň–Slovany, Plzeň–Roudná, Sokolov, Teplice, Ústí n. L.–Kočkov, Ústí n. L., Pasteurova, Hrad. Král.–Brměnská, Hrad. Král.–Sukovy Sady, Brno–Masná, Žďár nad Sázavou, Karviná–ZÚ, Olomouc, Ostrava–Přívoz, Ostrava–Bartovice, Ostrava–Mariánské Hory, Ostrava–Přívoz ZÚ, Košetice

The comparison of the prevalence of allergies from 1996–2006 according to age [Percentage of children %]

Legend:
- 1996
- 2001
- 2006

Source: Institute of Public Health

Categories: 5 age, 9 age, 13 age, 17 age, Groups

The breakdown of the Czech population supplied with drinking water from public water supply systems according to the degree of their exposure to the most problematic substances in 2007

Legend:
- Intake below 1 % of the EL
- 1–10 % of the EL
- 10–20 % of the EL
- Above 20 % of the EL

Source: Information system PiVo

EL – Exposure limit, Exposure is calculated for the daily intake of 1 litre of drinking water from a water supply system.

Categories: Arsen, Olovo, Chloroform, Dusičnany

Financing of environmental protection

Total statistically monitored expenditure for environmental protection reached CZK 63.5 billion in 2006, which represents an annual increase of 26.9 %. From the viewpoint of programming orientation, the largest resources were expended on waste management (CZK 28.8 billion), waste water disposal (CZK 14.3 billion) and air protection (CZK 7.45 billion) in 2006. The total expenditure to GDP ratio increased from 1.6 % in 2003 to 2 % in 2006 (see Chart 28). The greatest increase takes place within non-capital expenditure (by 81.5 % since 2003 when they started to be monitored).

The Czech Statistical Office puts the capital expenditure on environmental protection in 2006 at CZK 22.5 billion (i.e. 23 % more than in 2005). From the viewpoint of programming orientation, the largest resources were expended on wastewater disposal (CZK 7.4 billion) and air and climate protection (CZK 4.6 billion) in 2006. From the structural perspective, the volumes of all items showed annual increases in 2006, with the exception of wastewater treatment. The sharpest increase occurred in the expenditure on research and development (a 993 % increase) and on landscape conservation and biodiversity protection (a 294 % increase).

According to economic sectors, the greatest environmental protection expenditure in 2006 took place in the area of electricity, gas and water production and distribution (a total of CZK 9.5 billion, an annual increase of 6.7 %) and in the chemical and pharmaceutical industries (CZK 4.9 billion, an annual increase of 40 %).

In 2006, non-capital expenditure on environmental protection totalled CZK 41 billion. From the viewpoint of programming orientation, the largest portion of these resources was expended on waste management (CZK 25.4 billion, an annual increase of 48.5 %) and waste water disposal (CZK 6.9 billion, an annual decrease of 1.5 %).

From public expenditure on environmental protection monitored by the Ministry of Finance, a total of CZK 24.6 billion was expended from central sources on environmental protection in 2007. Within that amount, public expenditure on environmental protection from the state budget increased by 11.8 % to CZK 18.2 billion. Since 2005, when a massive one-off increase took place due the inclusion of the Czech Republic in the use of the European funds' resources, there has been a noticeable growing trend in the expenditure, especially on water protection (see Chart 30). The State Environment Policy's objective of increasing state budget expenditure on environmental protection (this concerned capital expenditure, which dropped sharply in the second half of the 1990s) has also been accomplished, with the increase having been especially large since 2005. In 2007, the top priority areas within the state-budget expenditure on environmental protection included water protection with a 33.8 % share in total expenditure and biodiversity and landscape protection with a 14.6 % share in total state-budget expenditure on environmental protection (other significant priorities in 2007 included the area of waste management with 6.4 % and administration

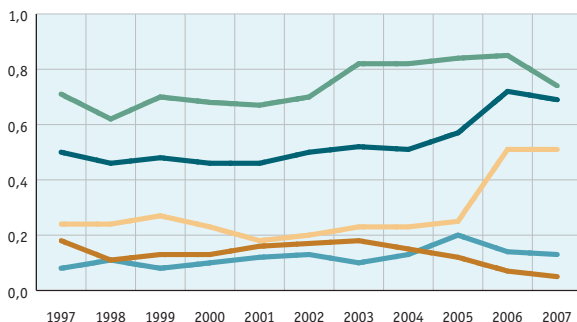## Total environmental protection expenditure in 2003–2006
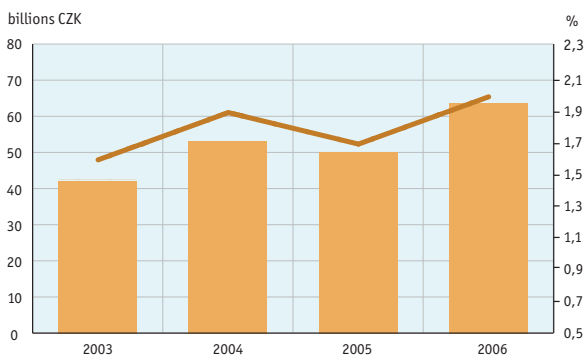
Chart 28

billions CZK / %

■ Total environmental protection
expenditure [billions CZK,
current prices]

━ Environmental protection
expenditure to GDP ratio
[%, current prices]

Source: Czech Statistical Office

Total environmental protection ex-
penditure includes both capital and
non-capital costs. Since non-capital
costs have only been monitored since
2003, the total expenditure time
series is only available since that
year. At the time of the preparation
of the report, data for 2007 was not
available.

Public expenditure on environmental protection in 1997–2007 [% of GDP, current prices]

Chart 29

━ Regional-budgeted
environmental protection
expenditures to GDP ratio

━ Environmental protection
expenditures from central
sources to GDP ratio

━ State-budgeted environmental
protection expenditures to GDP
ratio

━ Environmental protection
expenditures from the National
Property Fund to GDP ratio

━ State-fund environmental
protection expenditures to GDP
ratio

*Source: Ministry of finance, Czech
Statistical Office*

The National Property Fund of the
Czech Republic was abolished as of 1
January 2006. Both its competencies
and the resources spent on the reha-
bilitation of old ecological burdens
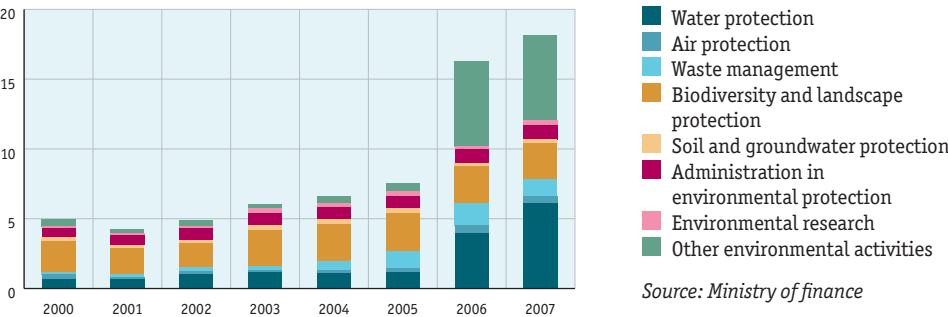are now administered by the Ministry
of Finance.

in environmental protection with 5.7% – see Chart 3). In 2007, a total of CZK 1.7 billion was expended on environmental protection within public expenditure from state funds, with most of the resources going to the areas of water protection (CZK 0.9 billion) and biodiversity and landscape protection (CZK 0.2 billion). Within the resources of the now-abolished National Property Fund administered by the Ministry of Finance, a total of CZK 4.7 billion was expended on the rehabilitation of old ecological burdens in 2007.

In addition to central sources, regional budgets represent another significant source of public expenditure used to finance environmental protection. **In 2007, CZK 26.3 billion was expended within public regional-budgeted expenditures on environmental protection**, of which 41.5%, i.e. CZK 10.9 billion went towards water protection, 30.5% to waste management (CZK 8 billion) and 26.1% (CZK 6.9 billion) to biodiversity protection.

The orientation of state-budgeted environmental protection expenditures from 2000–2007 [billions CZK current prices %]

Chart 30

- Water protection
- Air protection
- Waste management
- Biodiversity and landscape protection
- Soil and groundwater protection
- Administration in environmental protection
- Environmental research
- Other environmental activities

Source: Ministry of finance