2008

REPORT
ON THE ENVIRONMENT OF THE CZECH REPUBLIC

cenia

Ministry of the Environment
of the Czech Republic

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Prepared by the editorial team
of CENIA, the Czech Environmental Information Agency

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The Agency for Nature Conservation and Landscape Protection of the Czech Republic
The Transport Research Centre
The Environmental Centre of Charles University in Prague
The Czech Society for Ornithology
The Czech Hydrometeorological Institute
The Czech Statistical Office
The Czech Office for Surveying, Mapping and Cadastre
The Energy Regulatory Office
The Ministry of Transport
The Ministry of Finance
The Ministry of Industry and Trade
The Ministry of Health
The Ministry of Agriculture
The National Reference Laboratory for Noise Measuring in Municipalities
The Road and Motorway Directorate
The State Environmental Fund of the Czech Republic
The National Institute of Public Health
The Forest Management Institute
The Institute of Health Information and Statistics of the Czech Republic
The Forestry and Game Management Research Institute
The T. G. Masaryk Water Research Institute
The Regional Public Health Institute of Ostrava

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The enclosed CD contains the publications:
The Report on the Environment of the Czech Republic in 2008
The Regional State of the Environment in the Czech Republic 2008
The Statistical Yearbook of the Environment of the Czech Republic 2009

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Introduction

Pursuant to Act No. 123/1998 Coll., on the right to environmental information, and Government Resolution No. 446/1994, the Report on the Environment of the Czech Republic (hereinafter the Report) is annually submitted for approval to the Government of the Czech Republic and subsequently submitted for consideration to the Chamber of Deputies and the Senate of the Parliament of the Czech Republic.

The Report is a comprehensive document assessing the state of the environment of the Czech Republic, including its context. Since the 2005 edition, the compilation of the Report has been entrusted to CENIA, the Czech Environmental Information Agency.

The 2008 Report was discussed and approved by the Government on 30 November 2009, after which it was conveyed to both chambers of the Parliament of the Czech Republic. The Report is published in electronic form at http://www.mzp.cz and http://www.cenia.cz and also distributed in printed form.

Table of Contents

** change since 2002*

Methodology

The Report on the Environment (hereinafter referred to as the Report) is a basic environmental reporting document of the Czech Republic.
The current form of the Report has been published since 1994 with only slight or no changes to the methodology. As the need and demand for information and expert support for the political processes of the environmental sector have grown, the methodology of the Report has been modified in order to better reflect the requirements of those who use it and to provide conclusions relevant to policy-making.
The new methodology follows methodical trends applied in the EU and is in line with the gradual harmonizing process of reporting both at national and European levels.
The year to year dynamics of environmental changes do not call for an annual detailed analytical document on the environment and therefore the present approved system of national environmental reporting is founded on two basic pillars: the annual indicator-based Report on the Environment and a report entitled "The Environment of the Czech Republic – State and Outlooks" published every five years.
The new Report is based on authorized data obtained from monitoring systems administered by organizations both from within and outside the environmental sector. Data for international comparison is provided by Eurostat, the European Environment Agency (EEA) and the Organization for Economic Cooperation and Development (OECD).

THE USE OF INDICATORS TO DESCRIBE THE STATE OF THE ENVIRONMENT

The methodical basis of the new Report are indicators, i.e. precisely methodically described, aggregated indicators related to main environmental topics of the Czech Republic and objectives of the current State Environmental Policy of the Czech Republic for 2004–2010. Once a new State Environmental Policy of the Czech Republic has been prepared, the set of indicators should be harmonized so that new indicators are related to the new policy and can reflect annual fulfilment of the policy's objectives.
Environmental indicators are among the most widely used environmental assessment instruments. Based on data, they demonstrate the state, specifics and development of the environment and can indicate new topical environmental issues.
The use of indicators has substantially reduced the size of the Report and has made it more clearly arranged and user-friendly.

ENVIRONMENTAL ASSESSMENT USING A SET OF KEY INDICATORS

The formation and development of key indicators stemmed from the necessity to identify a small range of politically relevant indicators that, together with other information, respond to selected priority policy issues and take current topics into consideration. The set is an effective tool used to process the Report on the Environment and assess the fulfilment of preset objectives and priorities of the State Environmental Policy.

The set of key indicators includes 37 indicators, selected using the following criteria:

- Relevance for current environmental issues;
- Relevance for the current implemented state environmental policy strategies and international commitments;
- The availability of quality and reliable data over a long period of time;
- The relationship to the sectoral concept and its environmental aspects;
- The "cross-sectional" nature of the indicator – i.e. the coverage of the largest number of causal links;
- The relationship to indicators defined at the international level and detailed at the EU level.

In the future, the proposed set of indicators will not be static, but rather continuously modified to meet the needs of the applicable State Environmental Policy of the Czech Republic, the EEA set, environmental issues and the availability of underlying data sets.
Indicators included in the set of key indicators were developed by specialized work centres of the Czech Republic that have dealt with the issue for many years, or were adopted from internationally acknowledged sets (EEA CSI, Eurostat, OECD and others).

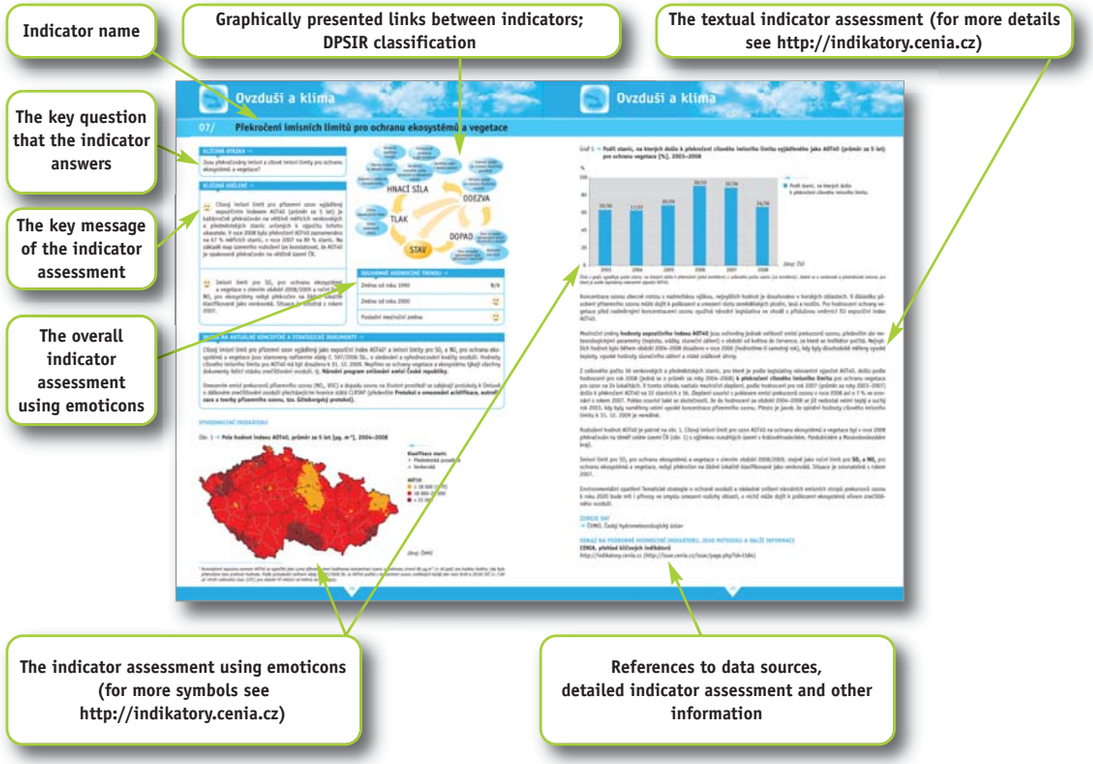
MESSAGES COMMUNICATED VIA INDICATORS

An indicator in the Report provides information across several hierarchical levels of detail. First, it provides comprehensible information – a key message, related (if currently possible) to a specific objective or another national or international obligation.
Each indicator is assessed according to a unified template and simultaneously presented at http://indikatory.cenia.cz in a more detailed form that in the Report, together with methodology specifications and other meta data. The Report provides a link to the website for each indicator.

EMOTICON SYMBOL KEY

☺	Trend – sustainable, develops positively in line with objectives we are heading towards.
😐	Trend – neither negative, nor positive development, stagnates.
☹	Trend – negative, without any link to the set objectives; the trend is constantly adverse.

INDICATOR ASSESSMENT STRUCTURE

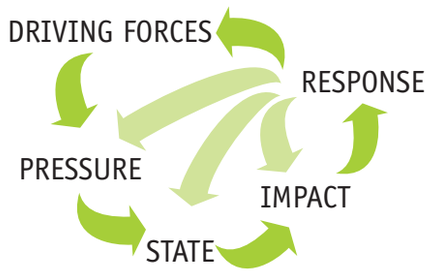


CLASSIFICATION AND INTERDEPENDENCE OF INDICATORS

Indicators in the Report are arranged in thematic areas and their position within the internationally applied DPSIR model (Driving Forces, Pressure, State, Impact and Response) is specified. The DPSIR model shows mutual dependence between factors affecting the state of the environment and instruments used to regulate them. State indicators (S) include the state (quality) of individual environmental components (such as water, air, soil, etc.); pressure indicators (P) directly impact the state (such as emissions). The driving force (D) is a factor of pressure (such as the energy intensity of the economy, the structure of primary energy basis). Impact (I) means damage to the environment and human health and responses (R) are implemented measures. Nevertheless, the classification of indicators may not be clear when taking into account the interpretation of individual dependences. Some indicators can be viewed as pressure, while from a different perspective they indicate the state. There is no definite classification.

An accompanying document of the indicator-based Report is the „The Environment of the Czech Republic – State and Outlooks", published every five years in relation to The State and Outlook Environmental Report of the European Environment Agency. The first edition is planned for 2011.

The fact that the document is published every five years allows for the use of a more comprehensive cross-section assessment of development and trends and represents the outlook of individual indicators subject to assessment.



Key messages of the Report on the Environment

Since 2006, **the state of the environment in the Czech Republic has been improving** after a period of fluctuation at the turn of the 20th and 21st centuries. Throughout 2008, the positive trend was accompanied by **a significant and, for the 21st century, uniquely decreased environmental strain**, caused by a lower amount of energy generation, a drop in the production of some manufacturing branches and, to a certain degree, by a decline in energy consumption in transportation. This trend was probably caused by the economic growth slowdown and the subsequent economic downturn in the 4th quarter of 2008, a result of the then beginning global recession.

In spite of some minor year to year improvement in 2008, **the quality of air remains unsatisfactory**, especially in densely populated areas. **Surface water pollution** continues to **decrease and surface water quality has been improving**; surface water withdrawal for public supplies has been declining and public water infrastructure facilities have expanded. **The state of sites and animal and plant species** of Community importance is still unsatisfactory as a result of anthropogenic activities.

A decline in **energy and material demands of the Czech economy** has continued and accelerated, which results in lower specific environmental strains per economic performance unit. Even though when measured in absolute figures, material consumption increased and energy consumption stagnated, the efficiency of material and energy transformation into an economic output have showed a clear upward trend. In spite of this improvement, the Czech Republic, just like the other countries of the Visegrád Four, continues to have high material and energy economic intensity.

Czech industry, whose share of total GDP is still a little higher than the EU15 norm, has shown a change in production structure towards "lighter" industries, i.e. a growth in the share of industrial branches that produce technologically more demanding products with higher added value and a lower energy and emission intensity (such as the automotive and electronic industries and computer technology manufacturing). In addition, practically all branches have undergone technologically innovative development.

In spite of an overall positive trend, **there are still some seriously and adversely developing environmental strains** whose impact, although territorially limited, deteriorates the quality of the environment and poses risks to human health and eco-systems. These involve growing **road transport**, which causes worse air quality in densely populated agglomerations and in areas close to busy roads. On top of that, transportation is the reason for the adverse development of **greenhouse gas emissions**. Another negative factor that mainly affects the conservation of biodiversity is **territorial development and related changes in land use**. The suburbanization process, especially in large cities, has been causing a fast increase in developed areas, resulting in a loss of biotopes for animal and plant species and affecting overall biological diversity. Changes in land cover are also caused by the development of transport infrastructure, agriculture, forest management and tourism.

THE MAIN POSITIVE FINDINGS OF THE REPORT:

- **The energy intensity of the Czech economy dropped by 6.4% on a year to year basis**, which has been the largest decrease since 2000.
- According to preliminary data, there was **a significant year to year decrease in emissions into the air** after a period of stagnation or a very slight decline. The emissions of acidifying substances dropped by 11%, the emissions of ozone precursors by 7% and the emissions of secondary particulate matter precursors by 11%.
- **Energy generation** decreased by 5.3% on year to year basis and since energy consumption remained the same, the loss was compensated for by a lower negative balance of exported and imported electricity, especially by a significant reduction in exports (by 24%).
- Energy generation in steam power plants declined by 9.7 on year to year basis in 2008 and **the share of zero-emission sources** (nuclear energy and renewable energy sources) in total energy generation **increased**.
- As far as the consumption of primary energy sources (PES) is concerned, there was a **decline in solid fuel consumption** by 9.2%; the total share of solid fuels in PES was 47% in 2008.
- Since 2000, industrial production has slowed down; the year to year increase was only 0.4%. **Industrial restructuring** has continued in favour of less energy-, material- and emission- intensive production.
- For the first time since 2000, **energy consumption in transportation decreased on year to year basis** in 2008 (by 1.6%), and pollutant emissions from transportation decreased by 2.3% for CO_2, 9.4% for CO, 6.6% for NO_x, 14.1% for VOC and 4.2% for particulate matter.
- On a year to year basis, **air quality improved and there were fewer areas where local concentrations were exceeded**, especially as far as PM_{10} were concerned. In spite of some improvement, the situation remains unsatisfactory. In 2008, 15% of the population was exposed to above-the-limit concentrations of PM_{10} (in 2007, it was 32%) and 42% of the population was exposed to above-the-limit concentrations of benzo(a)pyrene (in 2007, it was 51%).
- In 2008, **the share of ecologically farmed land** in the total area of agricultural land fund **increased** to 8.04% and the number of eco-farms almost doubled to 1,946. The target set in the State Environmental Policy of the Czech Republic to increase the share of agricultural land used for ecological farming to at least 6% by 2005 and 10% by 2010 is expected to be accomplished.
- Measured by **hazardous waste production** per capita, the Czech Republic had the fifth lowest production among the EU27 countries.
- **Public expenditures for environmental protection** show an upward trend. In 2008, CZK 27 billion from territorial budgets and CZK 17.4 billion from the central budget were spent (approximately 0.47% of GDP).

THE MAIN NEGATIVE FINDINGS OF THE REPORT:

- **Air pollution** is concentrated in densely populated areas. Measured by air pollution, the worst locations are the Ostrava-Karviná region (because of industry and power engineering) and the cities of Prague and Brno (heavy traffic).
- The target concentration of **ground-level ozone** has been exceeded in most places in the Czech Republic. In 2008, it concerned 93.8% of the Czech Republic's area that houses 69% of the population. In 2007, it was 97% of the area.
- The Czech Republic has had long-term, **very high specific emissions of greenhouse gases** (14.4 t CO_2 eq. per capita in 2007) that are among the highest in the EU (the EU15 average is 10.15 t CO_2 eq.).
- **Aggregated greenhouse gas emissions** slightly increased between 2005 and 2007, especially due to the steep growth of emissions from transportation. 2008 data is not yet available because of the emission reporting system in place.
- The state of almost three-quarters of **sites of Community importance** in the Czech Republic is assessed as unfavourable or unsatisfactory with regards to protection. The state of animal and plant species of Community importance is also alarming: 37% of the species are considered unsatisfactory and 36% as unfavourable with regards to protection.
- **The number of species of birds** in the agricultural landscape has been declining, mainly because of agricultural intensification and changes in land use (urbanisation, line structures, landscape fragmentation, etc).
- **The consumption of chemical fertilizers and plant protection products**, which has increased by 46% and 15% respectively since 2000, has not been reduced. The high consumption of chemical fertilizers poses a risk to soil and water quality and causes the eutrophication of water reservoirs.
- **Domestic material consumption** has been growing by approximately 1.5% on a year to year basis with more materials entering the economy. In addition, material dependency on foreign countries has been growing, and in 2007 reached 31.8% (2008 data are not available). This is mainly the result of higher crude oil and natural gas consumption, for which the Czech Republic is fully dependent on imports.
- **The share of developed areas have been increasing** (year to year it was by 0.3% in 2008) to the detriment of environmentally friendlier categories of land use.
- **Waste production** in 2006 and 2007 increased by 8% on a year to year basis; hazardous waste production grew by 22% in the same period.

The nature of environmental issues has been changing and the main potential for improving the state of the environment and reducing environmental strains has shifted **from production to consumption**. The main topics for the period to come should involve energy savings in the household segment and non-production private sector, an ongoing change in the energy mix used for energy generation and household heating and reducing the environmental impact of road transportation. During times of economic recession and the decline in economic performance in 2009, further reducing environmental strains and pollution in the main economic branches, with the exception of transportation where the situation remains unclear, can be anticipated. The structure of the vehicle fleet and the efficiency of measures taken to renew it will be decisive for more positive developments in transportation.

01/ Temperature and precipitation characteristics

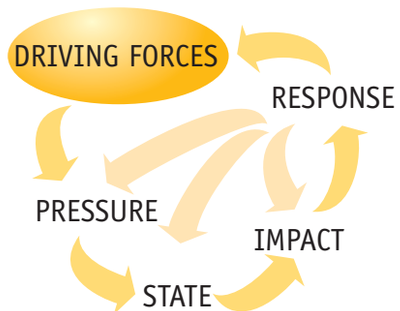
KEY QUESTION ➜

What were the temperatures and precipitation patterns that affected the condition of and the burden on the environment in the Czech Republic in 2008?

KEY MESSAGES ➜

In 2008, the Czech Republic had a very warm year, with an annual average temperature of 8.9 °C, i.e. 1.4 °C higher than the 1961–1990 long-term mean. The temperature was 0.2 °C lower than in 2007, making 2008 the third or fourth warmest since 1961. The same annual average temperature was recorded in 1994.

2008 was the second consecutive year with a very warm winter, which resulted in a 1% reduction in energy consumption for home heating (in 2007, the reduction was about 6%).
With regards to precipitation, 2008 was an average year with 619 mm. This represents 92% of the 1961–1990 long-term mean. By comparison with the long-term average, the lowest amount of precipitation was recorded in June.
In 2008, there were no major floods.



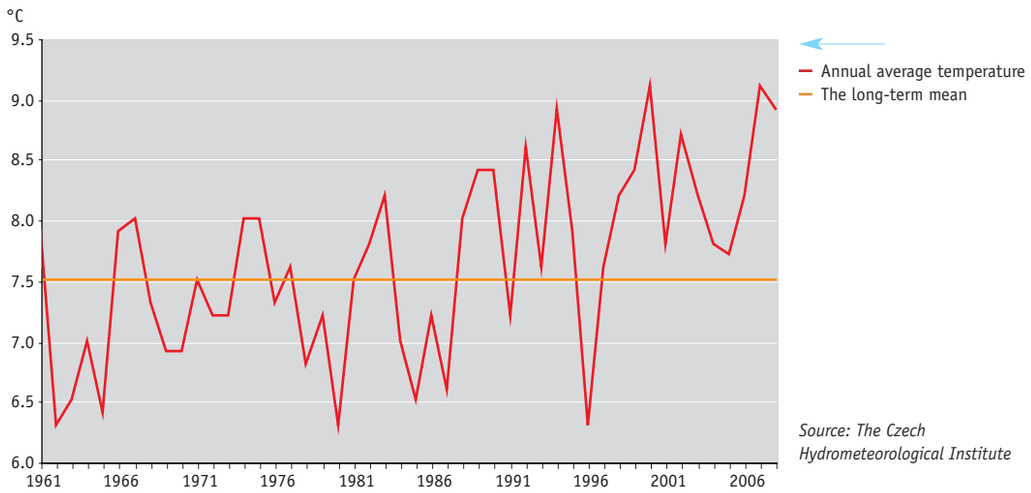
The temperature and the precipitation situations are the complex driving force for almost all indicators that are described in the Report. They affect energy consumption (and, by extension, energy production), air pollution, air emissions, agriculture, water quality, water management, as well as other environmental areas.

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Even though temperatures and precipitation are not directly addressed in any strategic document, they affect a number of natural and anthropogenic processes that influence the condition of the environment. Meteorological conditions thus affect the implementation of a wide range of strategies and the accomplishment of political objectives concerning air pollution, the quantity and quality of water resources, water management, the energy sector, agriculture and forestry, and human health protection.

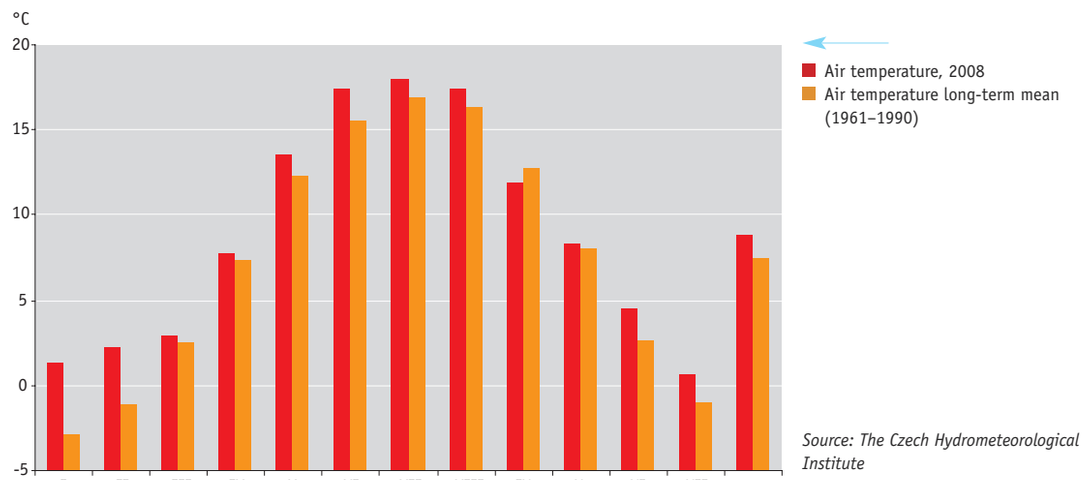
INDICATOR ASSESSMENT

Chart 1 ➜ **The annual average air temperature in the Czech Republic, areal averages* [°C], 1961–2008**



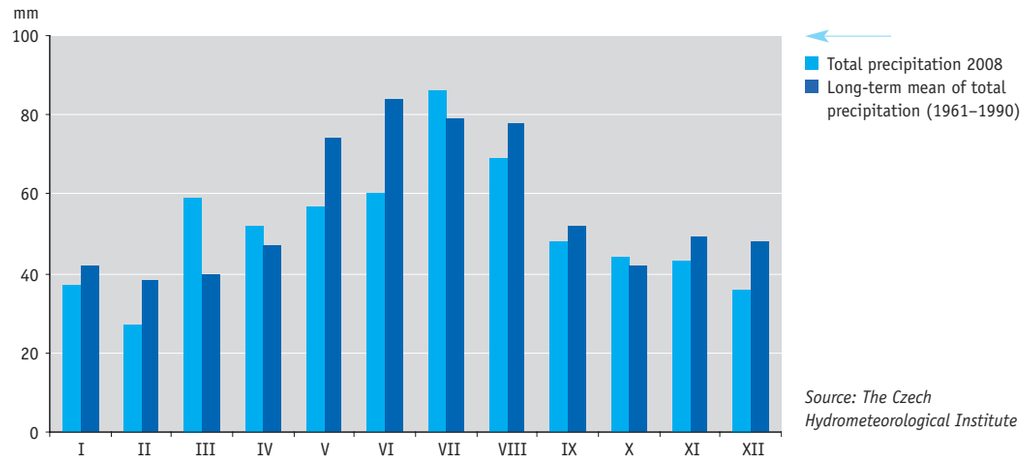
Source: The Czech Hydrometeorological Institute

Chart 2 ➜ **Monthly average air temperature in the Czech Republic (areal averages*) compared to the 1961–1990 long-term mean [°C], 2008**



Source: The Czech Hydrometeorological Institute

Chart 3 ➜ **Monthly precipitation totals in the Czech Republic (areal averages*) compared to the 1961–1990 long-term mean, 2008**



Source: The Czech Hydrometeorological Institute

** Areal averages for temperature and precipitation are used in order to smoothen the spatial differentiation of temperature and precipitation as needed for expressing time dynamics and for comparisons with the norm. They are calculated using a method of mathematical interpolation and, rather than a value for any particular location, they express the average value for the entire Czech Republic (corresponding to the median altitude).*

With respect to temperature, 2008 was above average, with an annual average temperature of 8.9 °C. This was 1.4 °C higher than the 1961–1990 long-term mean. This makes 2008 the 4th warmest year the Czech Republic has experienced since 1961 (2007 was even 0.2 °C warmer). According to the World Meteorological Organization (WMO), a temperature of 14.31 °C made 2008 the 10th warmest year globally since instrumental observation began in 1850, with all of the 10 warmest years being recorded after 1997. These data clearly confirm that the past ten years (1997–2008) were very warm, both globally and in Central Europe. This may be the result of anthropogenic impacts on the climate system.

With the exception of September, all months in 2008 had above-average temperatures. The largest positive deviations of monthly average temperatures were recorded in January and February (by 4.1 °C and 3.4 °C respectively). After the extremely warm winter of 2006/2007 (with a 6.1 °C deviation from the mean, January was the warmest in the continuous historical measurement

in Prague's Klementinum since 1775), the trend of very warm winters continued. Except for early January, that winter's weather had good dispersion conditions and strong advection from the west and southwest. Temperatures in the spring and the summer of 2008 were slightly above average; the first tropical days with temperatures exceeding 30 °C occurred in late May. The absolute maximum temperatures (maximum daily temperatures) reached 36 °C in Bohemia (recorded on 3 August 2008 at the Lázně Bělohrad station) and 34.6 °C in Moravia (recorded on 23 June 2008 at the Brod nad Dyjí station). With the exception of September and October, the end of the year was also warmer than average.

Higher temperatures in 2008 and the overall warming of the climate affect both the condition of and the burden on the environment. In the water management sector, impacts on both the quality (eutrophication) and the quantity of water resources are to be expected. In agriculture, this takes the form of increased water abstraction for irrigation, the increased use of agrochemicals in connection with pest infestation and changes in landscape use, especially with regards to the development of agriculture in areas that have been climatically unsuitable thus far and, on the contrary, the reduced cultivation of certain crops due to unsuitable climate (lack of precipitation) in other areas. Warm winters have a positive effect on energy consumption for heating – this was confirmed in 2008 (a decrease of about 1% versus the previous year that also had a warm winter) – and on air emissions connected with heat generation. From the perspective of human health protection, unusually high summer temperatures pose a threat to certain groups within the population.

In terms of **precipitation**, 2008 was an average year with a total amount of 619 mm, i.e. 92% of the 1961–1990 long-term mean. The spatial distribution of precipitation in the Czech Republic was affected, in addition to altitude, by the windward and leeward effects of mountain barriers. The greatest amount of annual precipitation (1 494.4 mm) was measured at the Železná Ruda-Špičák station and the lowest (339.5 mm) was at the Branišovice station.

In 2008, the **months with the highest amounts of precipitation** were March, April and July, while June had the lowest total precipitation compared to the long-term mean. The largest positive deviation from the mean was recorded in March, which had a total precipitation of 59 mm. This corresponds to 148% of the mean. By contrast, the driest months of the year included February, June and December, all of which had less than 75% of the monthly precipitation mean.

According to the Czech Hydrometeorological Institute's Annual Report on the Hydrometeorological Situation in the Czech Republic, **2008 was a very quiet year in terms of flood frequency**. Increased river levels were first recorded in the north in the last third of January, when there was also precipitation in the mountains and snow melted. The most significant rise in river levels was recorded in late February and early March, especially in small mountain streams in southern and eastern Bohemia, when frontal systems associated with the Emma low pressure area passed over the Czech Republic. The subsequent period only experienced sporadic increases in river levels, except at the end of October, when there were some temporary increases in smaller streams in the Krkonoše, the Jizerské and the Orlické Mountains.

DATA SOURCES

➜ The Czech Hydrometeorological Institute

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1594)

Information about climate on the Czech Hydrometeorological Institute's website
http://www.chmi.cz/meteo/ok/infklim.html

The Czech Hydrometeorological Institute's Department of Climate Change
http://www.chmi.cz

The World Meteorological Organization
http://www.wmo.int

The European Environment Agency
http://www.eea.europa.eu/themes/climate

Atmosphere and Climate

02/ Greenhouse gas emissions

KEY QUESTION ➜

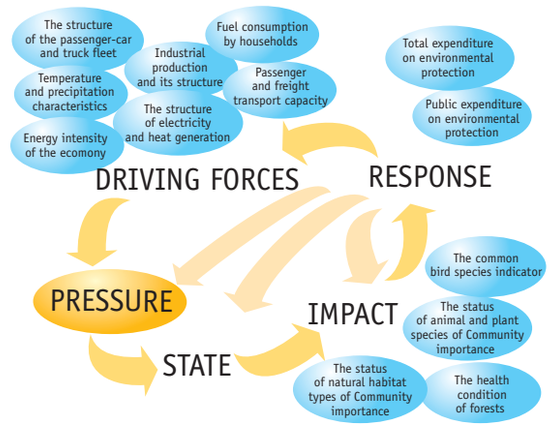
Are the national greenhouse gas emission reduction targets being successfully met?

KEY MESSAGES ➜

For the 2008–2012 control period, the Czech Republic is ahead of its commitment (between 1990 and 2007[1], the emission levels dropped by approximately 23%; the commitment was 8%).

Czech enterprises involved in the emission trading system (EU ETS) showed 8.3% less CO_2 emissions in 2008 than the year before. After a growth in emissions between 2005 and 2007, this is a significant year-to-year drop.

Since 2000, emissions have been virtually stagnating, showing a slight decrease from 2005–2007. The main reason is a long term increase in emissions from transportation (in 2007, emissions from transportation accounted for more than 13% of total emissions, while in 1990 it was not even 5%). The objective of the State Enviromental Policy CR (to decrease greenhouse gas emissions) is not being accomplished. Another of the Czech Republic's problems is a high level of specific greenhouse gas emissions per capita: in 2007, they were 14.4 t CO_2 equivalent per capita and there has been an upward trend.



OVERALL ASSESSMENT ➜

Change since 1990	😐
Change since 2000	☹
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The Czech Republic is a signatory to the UN Framework Convention on Climate Change and the **Kyoto Protocol**. The Kyoto Protocol binds the Czech Republic to reduce aggregate greenhouse gas emissions in the 2008–2012 control period by 8% compared to the 1990 base year. During the preparation and negotiations concerning the post-2012 agreement, the approval of the **climate-energy package**, which was stated in the conclusions of the European Council dated 12 December 2008, is crucial for the EU27. The package contains 4 directives that are supposed to help meet the EU emission reduction target and reduce total greenhouse gas emissions by at least 20% by 2020 as compared to the 1990 reference year (this objective is independent of the result of international negotiations concerning future commitments after 2012). The EU also agreed to reduce total greenhouse gas emissions within the group of developed countries by 30% by 2020 as compared to the 1990 reference year (this is a specific target proposal by the EU for international negotiations concerning commitments after 2012 provided that other developed countries join in).

Priority area 4 of the **Czech Republic's State Environmental Policy**, "Protection of Earth's Climate System and the Prevention of the Long-range Transport of Air Pollution" aims at reducing greenhouse gas emissions in line with commitments adopted within the EU and the UNFCCC. Another aim of the Czech Republic's State Environmental Policy is to reduce specific per capita greenhouse gas emissions.

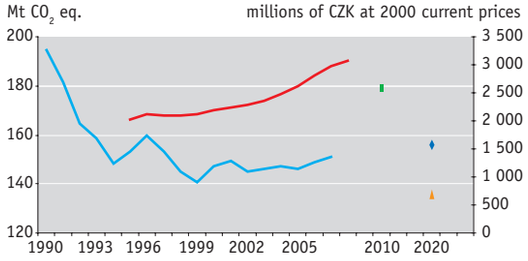
In 2004, after the Czech Republic joined the EU, the **National Programme for the Reduction of Climate Change Impacts in the Czech Republic** was created. One of the main objectives of the National Programme is to reduce per capita specific greenhouse gas emissions by 25% by 2020 (after the end of the first control period of the Kyoto Protocol) as compared to 2000, i.e. to 10.1 t CO_2 eq. per capita, and to increase the share of renewable energy sources in the consumption of primary energy sources to 6% by 2010 and 20% by 2030.

In 2007, the National Programme was evaluated as to the effects of measures adopted in 2004–2006 and the initial state and reduction achieved since its adoption were compared. Based on the assessment a new **Climate Protection Policy of the Czech Republic** was prepared that responds to new scientific knowledge and the development of political negotiations in the Czech Republic and the international situation, defining a climate protection strategy of the Czech Republic with the aim to gradually decrease greenhouse gas emissions, efficiently deal with the consequences of global warming and mitigate their negative impacts.

[1] *2008 emission inventory data are not available yet. The results of the greenhouse gas inventory are regularly submitted to the Secretariat of the UN Framework Convention for the last processed year (here 2006) within 15 months from the end of the preceding year.*

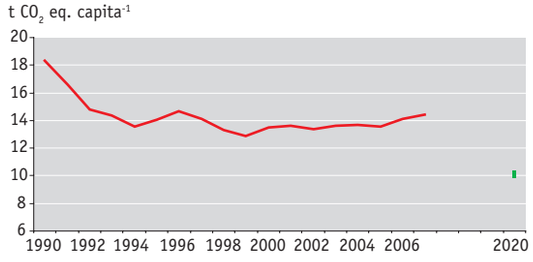
INDICATOR ASSESSMENT

Chart 1 ➜ **Development of aggregate greenhouse gas emissions (excluding LULUCF) and gross domestic product in relation to the meeting of the Czech Republic's reduction targets, 1990–2007**



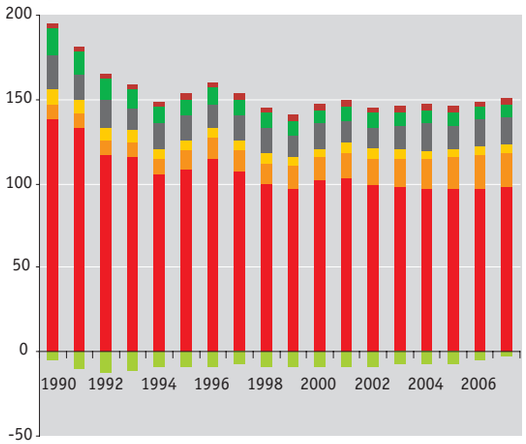
Source: The Czech Hydrometeorological Institute, The Czech Statistical Office

Chart 2 ➜ **Development of greenhouse gas emissions per capita in the Czech Republic and the objective of the National Programme for the Reduction of Climate Change Impacts, [t CO_2 eq. per capita], 1990–2007**



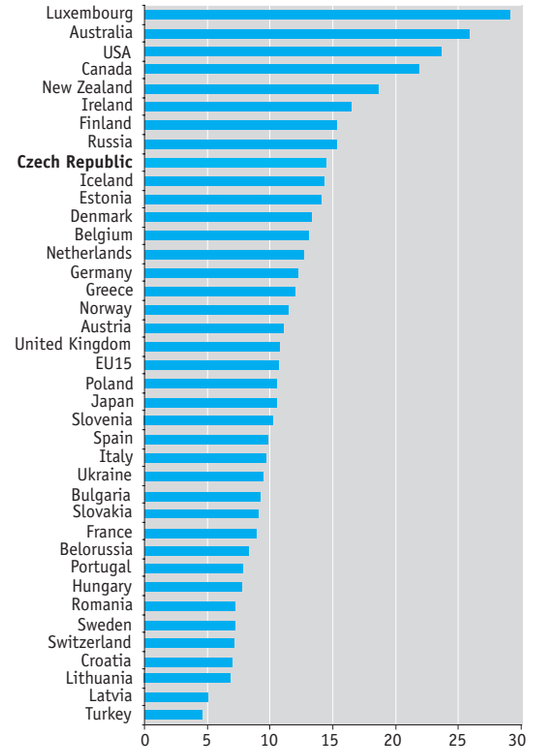
Source: The Czech Hydrometeorological Institute, The Czech Statistical Office

Chart 3 ➜ **The development of greenhouse gas emissions by sector in the Czech Republic [Mt CO_2 eq.], 1990–2007**



Source: The Czech Hydrometeorological Institute, The Czech Statistical Office

Chart 4 ➜ **An international comparison of specific greenhouse gas emissions per capita [t CO_2 eq. per capita], 2007**



Source: The Czech Hydrometeorological Institute, The Czech Statistical Office

Atmosphere and Climate

Between 1990 and 2007, the Czech Republic decreased its greenhouse gas emissions, excluding LULUCF[1] emissions and drops, from 194.7 Mt to 150.8 Mt CO_2 eq, i.e. **by approximately 23%** (or from 190.1 Mt to 149.1 Mt CO_2 eq, i.e. by 21.5% including LULUCF). The commitment contained in the Kyoto Protocol (decreasing emissions by 8% before the 2008–2012 control period) will be well accomplished. A steep decline began to be seen as early as the beginning of the 1990s and since then, emissions have been stagnating. From 2000–2007, there actually was a slight increase by approximately 2% mainly caused by a negative development of transportation emissions and a slower drop in LULUCF emissions (random wood harvesting due to natural disasters).

The share of CO_2 emissions in total greenhouse gas emissions (excluding LULUCF) was 86.2% in 2007, the share of CH4 emissions was 7.8%, N_2O emissions were 5.0% and the share of fluorine containing gases (F-gases) was 1.1%. The shares of N_2O and CH_4 emissions in total greenhouse gas emissions have remained the same; the share of F-gases has been increasing.

According to the EU ETS records, enterprises that belong to the system produced 80.5 Mt CO_2[2] in 2008, which is **8.3% less than in 2007**. The largest drop was registered in the energy sector (by 9.5%) and iron, steel and coke making (8.4%). Businesses involved in the system produce about 65% of all CO_2 emissions reported in the emission inventory and therefore, greenhouse gas emissions can be expected to decrease again in 2008.

From the long-term perspective, the development of greenhouse gas emissions has been negatively affected by the composition of primary energy sources with a high share of solid fuels, the remaining high energy intensity of the Czech economy (even though the energy intensity has recently markedly decreased) and the relatively high share of industry in GDP. Problems in the transportation sector include the ever increasing transport capacity, which is the source of most greenhouse gas emissions, and the unfavourable composition of both the passenger and freight fleets (a large number of older vehicles that do not comply with EURO 2–4 emission standards).

Another of the Czech Republic's problems is the very high and not decreasing specific greenhouse gas emissions per capita that reached 14.4 t CO_2 eq. per capita in 2007 and are among the highest in the EU (the EU15 average is 10.15 t CO_2 eq.). The emission intensity of GDP formation (specific emissions per GDP unit) has been decreasing, but mainly due to the growth of GDP (currently it is at about 50 kg CO_2 eq. per CZK 1 000). This means relative decoupling when the growth rate of economic performance is faster than that of emissions.

As a result of the above greenhouse gas emissions development, the Czech Republic has not been able to approach the target established by the National Programme – that CO_2 emissions will gradually decrease so that by 2020, they will have reached approximately 10.1 tonnes per capita (i.e. the 2000 level of EU15). This trend was confirmed by an Assessment of the National Programme for the Reduction of Climate Change Impacts in the Czech Republic carried out in 2007. Therefore, the Climate Protection Policy of the Czech Republic is being prepared to set new reduction targets.

DATA SOURCES

- ➜ The Czech Hydrometeorological Institute
- ➜ The European Environment Agency (EEA)
- ➜ The Czech Statistical Office

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1508)

National System of Greenhouse Gas Inventories (NIS), The Czech Hydrometeorological Institute
http://www.chmi.cz/cc/start.html

The United Nations Framework Convention on Climate Change (http://www.unfccc.org)
The EEA Central Data Repository
http://cdr.eionet.europa.eu

EEA indicators
http://www.eea.europa.eu/themes/climate

[2] For the purpose of the Kyoto Protocol, emissions are provided without the LULUCF sector (Land Use, Land Use Change and Forestry). Nevertheless, some decline in LULUCF can be used to compensate emissions pursuant to Articles 3.3 and 3.4 of the Kyoto Protocol.

[3] Only carbon dioxide emissions (CO_2) are reported in the EU ETS.

03/ Emissions of acidifying substances

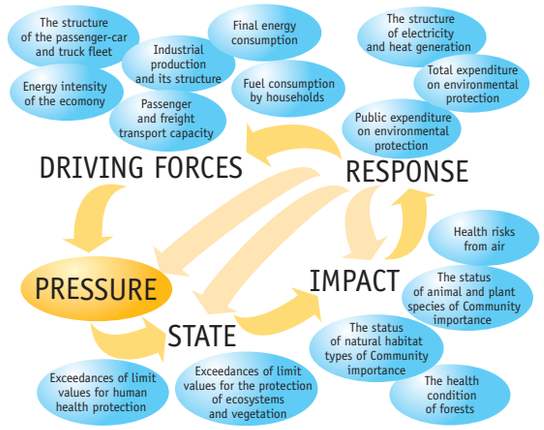
KEY QUESTION ➜

Have we succeeded in reducing air pollution with acidifying substances that adversely affect human health and ecosystems?

KEY MESSAGES ➜

Between 2000 and 2007, there was a nearly 8% reduction in the emissions of acidifying substances. In 2008, emissions of acidifying substances were reduced by more than 11% versus 2007 and by more than 18% versus 2000. Following a period of slight decline beginning in 2000, 2008 showed the first relatively significant annual decrease.

The levels of emissions of acidifying substances are below the national emission ceilings, which are most likely to be met.



OVERALL ASSESSMENT ➜

Change since 1990	🙂
Change since 2000	😐
Last year-to-year change	🙂

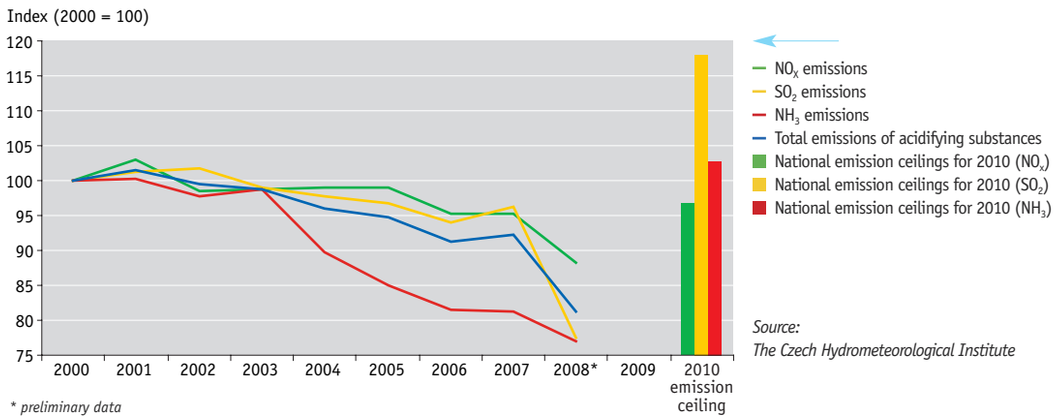
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Requirements for reducing acidifying substances are addressed by the **National Emission Reduction Programme of the Czech Republic**. National emission ceilings for individual pollutants for 2010 were laid down by Directive 2001/81/EC of the European Parliament and of the Council on national emission ceilings for certain atmospheric pollutants, which is based – among others – on the relevant protocols of the **CLRTAP Convention**. The following emission ceilings are to be met by 2010: SO_2 (265 kt per year), NO_x (286 kt per year) and NH_3 (80 kt per year).

An important international document is the **Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone (the Gothenburg Protocol) to the Convention on Long-Range Transboundary Air Pollution (CLRTAP)**. The Protocol aims to control and reduce the emissions of sulphur, nitrogen, ammonia and volatile organic compounds that adversely affect human health, natural ecosystems, materials and agricultural crops as a result of acidification, eutrophication and ground-level ozone formation.

INDICATOR ASSESSMENT

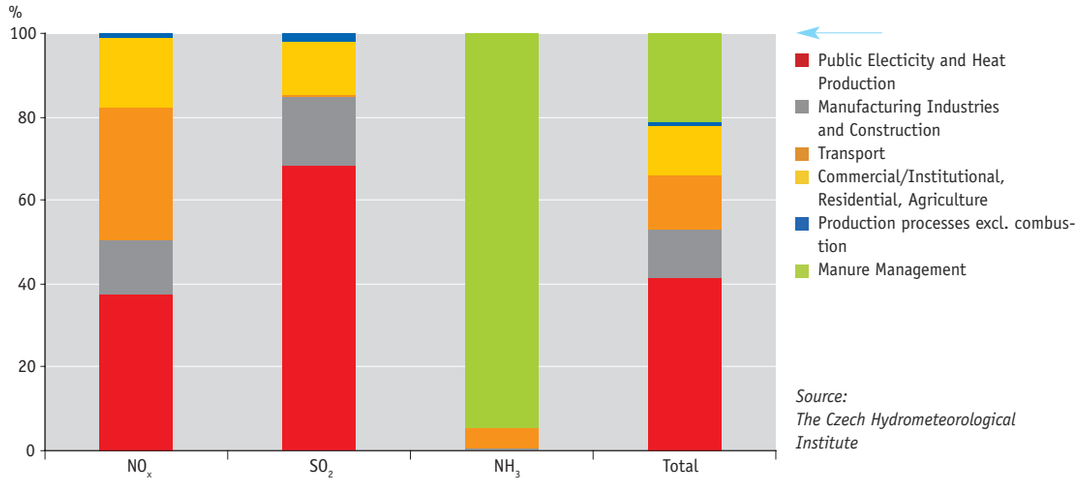
Chart 1 ➜ **The total emissions of acidifying substances in the Czech Republic, 2000–2008* and the level of national emission ceilings for 2010 [index, 2000 = 100]**



Source:
The Czech Hydrometeorological Institute

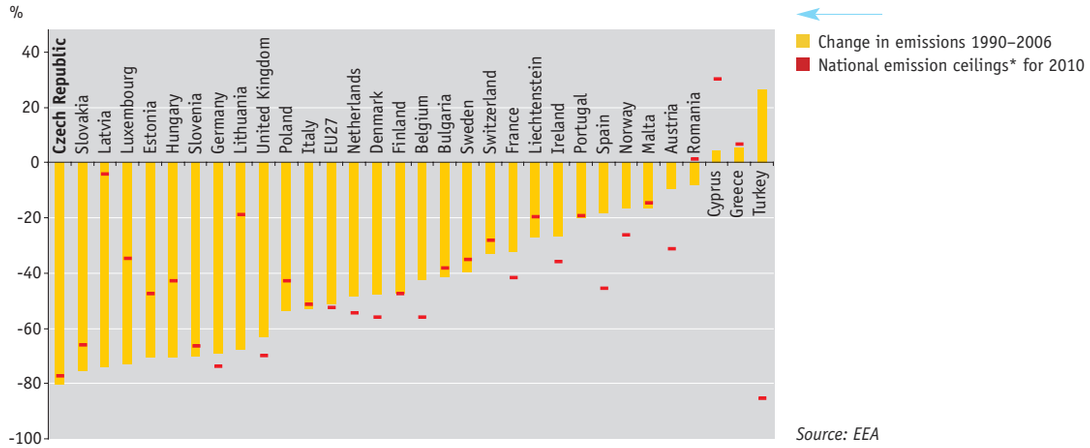
** preliminary data*

Chart 2 ➜ **Sources of emissions of acidifying substances in the Czech Republic [%], 2007**



Source:
The Czech Hydrometeorological Institute

Chart 3 ➜ **The difference between the emissions of acidifying substances in 2006 and individual national emission ceilings for 2010 in selected European countries [%]**



Source: EEA

** For non-EU member states (Switzerland, Liechtenstein, Norway), targets under the Gothenburg Protocol are indicated.*

All emissions and calculated indices are based on emissions that are expressed as the 'acidification equivalent'. The value of the indicator is obtained by adding up total annual emissions in tonnes multiplied by their acidification equivalent factor. Acidification equivalent factors for the above pollutants are as follows: NO_x = 0.02174; SO_2 = 0.03125 and NH_3 = 0.05882.

Nitrogen oxides, sulphur dioxide and ammonia are substances that have the greatest impact on the acidification of the environment (soil and water ecosystems). Sulphur dioxide and nitrogen oxides contribute nearly equally to the emissions of acidifying substances (37% and 39% respectively). The remaining portion (24%) consists of NH_3.

Between 1990 and 2007, the emissions of these substances were reduced by nearly 80% (from 79 to 17 kt per year (acidification equivalent)], and between 2000 and 2007 by 8% [from 18 to 16.6 kt per year (acidification equivalent)). At the beginning of the 21st century, there was only a moderate decline in **emission production** (Chart 1). In the context of a relatively strong growth in economic activity that was accompanied by annual GDP growth figures, even the above trend can be viewed positively. Preliminary results for the development of the indicator suggest that in 2008 the emissions of acidifying substances were reduced by more than 11% versus 2007 and by more than 18% versus 2000. The annual decline was largely attributed to SO_2, by almost 8%. After a period of stagnation for the indicator (or, more precisely, a small decrease) starting in 2000, 2008 was the first year to experience a significant annual decrease. In 2008, emissions of acidifying substances reached 14.6 kt/year (acidification equivalent).

In economic terms, the end of 2008 may already be included in a period of sluggish growth and stagnation. At the end of the year, some sectors may even have experienced an annual decline in economic activity. One of the causes of the annual decrease in NO_x and SO_2 emissions in 2007–2008 was reduced electricity generation. Total electricity generation in the Czech Republic decreased by 5.3% (production in steam power plants decreased by 10%). Another cause of the decrease in emissions was the reduced production in the industrial sectors, which produce the most emissions (the production of non-metallic and mineral products – 3.4%; metals and metallurgical products – 2.5%; and wood products –11.6%). The decrease in emissions of acidifying substances was also recorded in the transport sector. A stagnating and increasing transport performance was offset by the gradual replacement of the fleet and by reduced energy consumption in transport.

Based on the final data for 2007, it is safe to say that **the principal emission sources** of acidifying substances are the public energy sector (electricity and heat generation) and transport (Chart 2). Compared with 2000, there was no significant change in the structure of emission sources.

The 2008 figures for the emissions of acidifying substances for the entire Czech Republic are below the set ceiling (Charts 1 and 3). While some recommended values may have slightly been exceeded at the level of self-governing regions, it can be assumed even there that the recommended **emission ceilings** will be met in the subsequent period.

The Thematic Strategy on Air Pollution notes that air pollution and its effects on the health and the quality of life of EU citizens are too extensive for steps beyond the current legislation not to be taken. In connection with acidifying substances, it proposes stricter national emission ceilings and requires greater integration of air protection aspects into other sectoral policies. Compared to 2000, the Thematic Strategy on Air Pollution envisages the following emissions reduction for the European Union by 2020: SO_2 reduced by 82%, NO_x by 60% and NH_3 by 27%.

DATA SOURCES

- The Czech Hydrometeorological Institute
- The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1522)

The National Emission Reduction Programme of the Czech Republic
http://www.mzp.cz/cz/narodni_program_snizovani_emisi_cr

The Emission Balance of the Czech Republic
http://www.chmi.cz/uoco/emise/embil/emise.html
http://issar.cenia.cz/issar/page.php?id=108

The CLRTAP Convention
http://www.mzp.cz/www/zamest.nsf/defc72941c223d62c12564b30064fdcc/7ea7a77d1457fc35c12565160028d316?OpenDocument

The European Environment Agency, the indicator in an international form
http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20081014122413/IAssessment1226069684950/view_content

04/ Emissions of ozone precursors

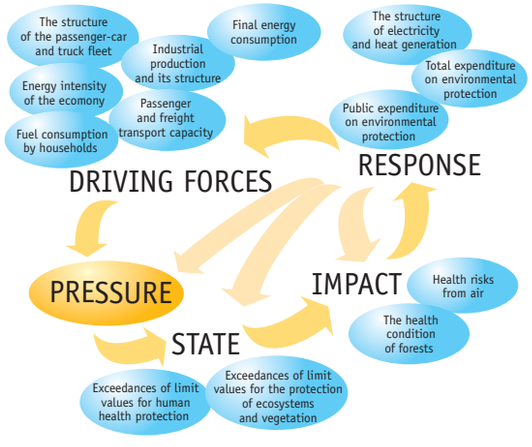
KEY QUESTION

Have we succeeded in reducing the emissions of the precursors of ground-level ozone that adversely affect human health and vegetation?

KEY MESSAGES

Between 2000 and 2007, the emissions of ground-level ozone precursors were reduced by almost 8%. In 2008, the emissions of ozone precursors were reduced by more than 7% compared to 2007. Following a period of slight decline starting in 2000, 2008 was the first year to show a significant annual decrease.

Levels of emissions of ground-level ozone precursors for which national emission ceilings have been set (VOC and NO_x) are below their level and therefore, it may be presumed that their ceilings have been met.



OVERALL ASSESSMENT

Change since 1990	🙂
Change since 2000	🙂
Last year-to-year change	😐

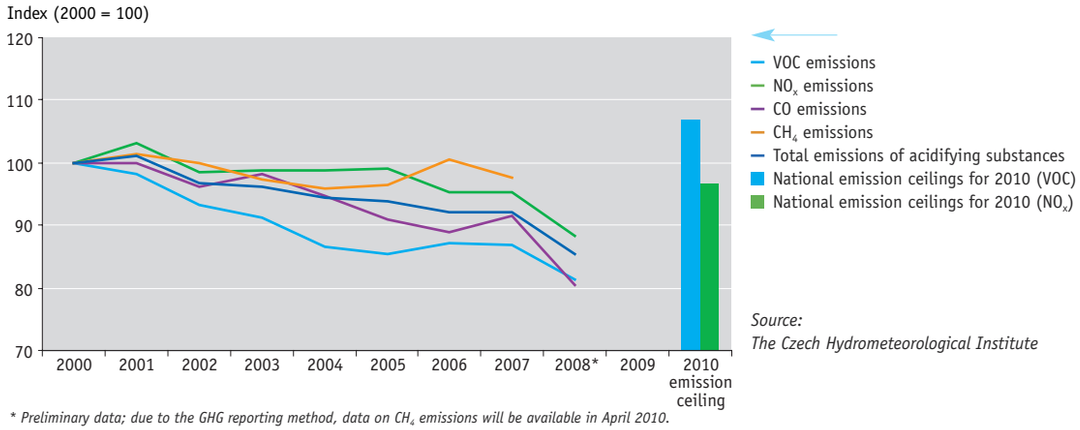
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

Reducing the emissions of ozone precursors (VOC, NO_x), i.e. substances from which ground-level ozone forms in the atmosphere, is addressed by the **National Emission Reduction Programme of the Czech Republic**. National emission ceilings for individual pollutants for 2010 were laid down by Directive 2001/81/EC of the European Parliament and of the Council on national emission ceilings for certain atmospheric pollutants, which is based – among other things – on the relevant protocols to the **CLRTAP Convention**. National emission ceilings for NO_x (286 kt per year) and VOC (220 kt per year) are to be met by 2010.

An important international document is the **Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone to the Convention on Long-Range Transboundary Air Pollution** (CLRTAP). The Protocol aims to control and reduce the anthropogenic emissions of sulphur, nitrogen, ammonia and volatile organic compounds that adversely affect human health, natural ecosystems, materials and agriculture as a result of acidification, eutrophication and ground-level ozone.

INDICATOR ASSESSMENT

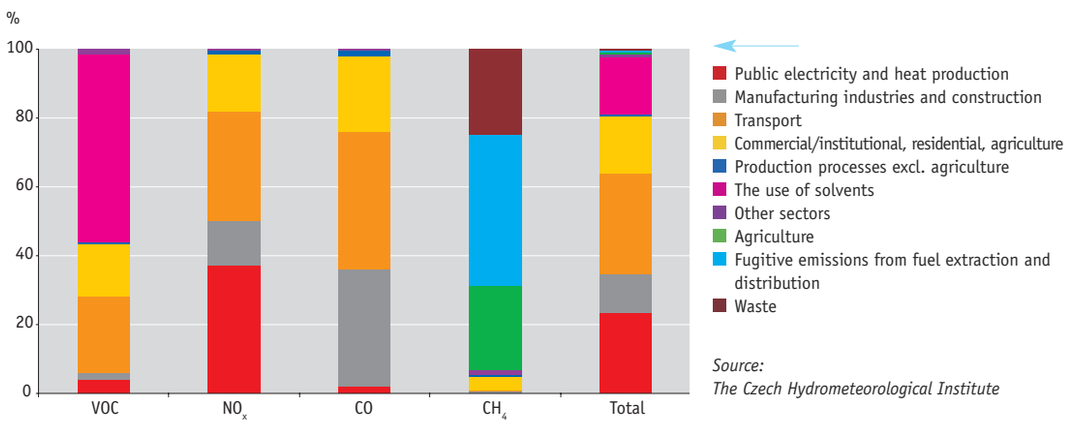
Chart 1 ➜ **The total emissions of ozone precursors in the Czech Republic, 2000–2008* and the levels of national emission ceilings (for VOC and NO_x) for 2010 [index, 2000 = 100]**



Source:
The Czech Hydrometeorological Institute

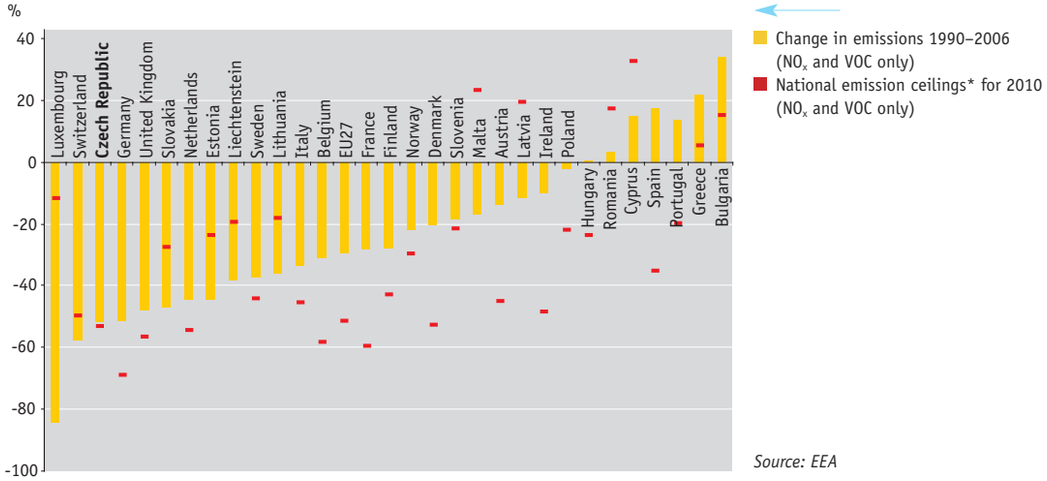
** Preliminary data; due to the GHG reporting method, data on CH_4 emissions will be available in April 2010.*

Chart 2 ➜ **Emission sources of ozone precursors in the Czech Republic [%], 2007**



Source:
The Czech Hydrometeorological Institute

Chart 3 ➜ **The difference between the levels of ozone precursor emissions (NO_x and VOC only) in 2006 and the individual national emission ceilings for 2010 in selected European countries [%]**



Source: EEA

** For non-EU member states (Switzerland, Liechtenstein, Norway), targets under the Gothenburg Protocol are indicated.*

All emissions and calculated indices are based on emissions that are expressed as the 'ground-level ozone formation potential'. The value of the indicator is obtained by adding up the total annual emissions in tonnes multiplied by their factor of the ground-level ozone formation potential. The factors of the tropospheric ozone formation potential for the above pollutants are as follows: for VOC = 1; for NO_x = 1.22; for CO = 0.11 and for CH_4 = 0.014.

Volatile organic compounds, nitrogen oxides, carbon monoxide and methane are the 'precursors' of ground-level ozone, i.e. an air pollutant that forms in the atmosphere secondarily. Ground-level ozone has been proven to adversely affect both human health and vegetation. The formation of ground-level ozone is largely attributable to NO_x (59%) and VOC (31%). CO contributes 9%, CH_4 1%. The situation has not significantly changed since 2000.

Atmosphere and Climate

Between 1990 and 2007, ground-level ozone **precursor emissions were reduced** by almost 54% (from 1 266 to 585 kt per year (expressed as the ground-level ozone formation potential)), between 2000 and 2007 by 8% (from 634 to 585 kt per year (expressed as the ground-level ozone formation potential)) (Chart 1). In the context of a relatively strong economic growth associated with annual GDP growth, the above trend can also be viewed positively. Preliminary results indicate that in 2008, precursor emissions were reduced by more than 14% versus 2000 and by more than 7% versus 2007. The decrease in 2008 was largely attributable to NO_x, by namely 4%. VOC contributed 2% to the decrease and CO contributed 1%. Following the mild decline seen since 2000, 2008 was the first year to show a significant decrease. In 2008, emissions of ozone precursors reached a level of 542 kt per year (expressed as the ground-level ozone formation potential).

In economic terms, the end of 2008 was a period of sluggish growth and stagnation. At the end of the year, some sectors began to show an annual decline in economic activity. The decrease in NO_x and CO emissions was caused by reduced total electricity generation and by reduced production in the industrial sectors, which are the most significant producers of emissions (the production of non-metallic and mineral products – 3.4%; metals and metallurgical products – 2.5%; and wood products –11.6%). Total electricity generation in the Czech Republic decreased by 5.3% (production in steam power plants decreased by 10%). The emission reduction in transport was caused by the gradual replacement of the fleet and the reduced energy consumption that have offset the stagnating and increasing transport performance.

Based on final data for 2007, it is safe to say that **the principal emission sources** of ozone precursors are transport, the public energy sector (electricity and heat generation) and the use of solvents (Chart 2). There has been no significant change in the structure of emission sources since 2000.

The 2008 figures for the emission of ozone precursors for which **national emission ceilings** have been set (VOC and NO_x) are – i.e. for the entire Czech Republic – below the set ceiling (Charts 1 and 3). While some recommended levels of emission ceilings may have been slightly exceeded in self-governing regions, it can be assumed that even there the recommended emission ceilings will be met in the subsequent period.

The Thematic Strategy on Air Pollution notes that air pollution and its effects on the health and the quality of life of EU citizens are too significant for additional steps not to be taken. In connection with ground-level ozone and its precursors, it proposes stricter national emission ceilings and requires greater integration of air protection aspects into other sectoral policies. **By 2020**, it proposes reducing VOC emissions by 51% and NO_x emissions by 60% within EU member states compared to 2000 levels. A large portion of these emission reductions will be achieved through measures that have already been adopted and implemented by member states. A revision of existing legal regulations on ambient air quality should lead to further emission reductions.

DATA SOURCES

➜ The Czech Hydrometeorological Institute
➜ The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1524)

The National Emission Reduction Programme of the Czech Republic
http://www.mzp.cz/cz/narodni_program_snizovani_emisi_cr

The Emission Balance of the Czech Republic
http://www.chmi.cz/uoco/emise/embil/emise.html
http://issar.cenia.cz/issar/page.php?id=108

The European Environment Agency, the indicator in the international form
http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20081014123013/IAssessment1226322854001/view_content

05/ Emissions of primary particles and secondary particulate matter precursors

KEY QUESTION ➜

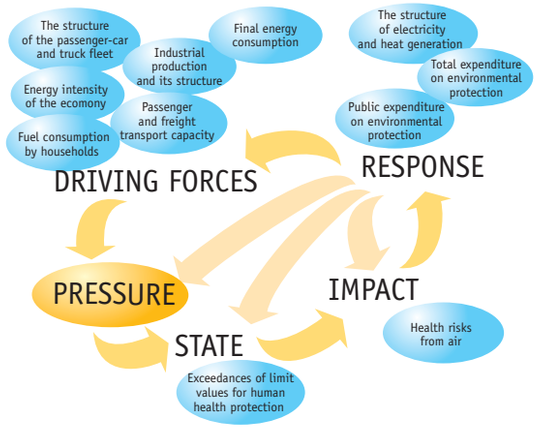
Have we succeeded in reducing air pollution by suspended particles that adversely affect human health?

KEY MESSAGES ➜

The emissions of primary PM_{10} particles only contribute 8% to total emissions. Between 2003 and 2007, PM_{10} emissions decreased by 15%.

The remaining portion of particulate matter (92%) forms in the air from its precursors (NO_x, SO_2, NH_3). In 2008, there was a reduction in the emissions of these substances by almost 11% versus 2007 and 15% versus 2003.

Between 2003 and 2007, the total emissions of primary particles (PM_{10}) and precursors (NO_x, SO_2, NH_3) decreased by 6%. NO_x, SO_2 and NH_3 levels are below the national emission ceilings and the ceilings may thus be presumed to be met.



OVERALL ASSESSMENT ➜

Change since 1990	N/A
Change since 2000	N/A
Last year-to-year change	🙂

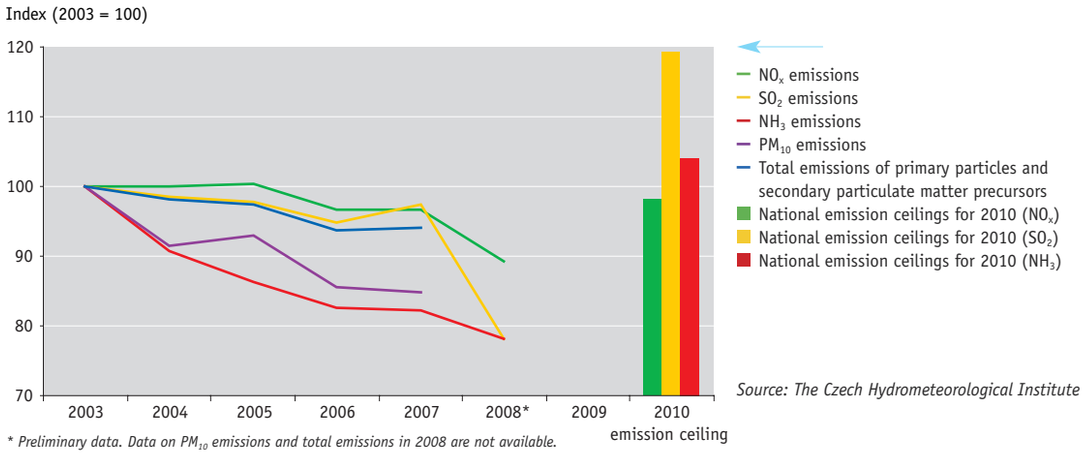
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The National Emission Reduction Programme of the Czech Republic addresses both air pollution with primary PM_{10} particles (i.e. that are emitted directly from the source), and the pollutants from which these particles may form in the atmosphere (secondary particulate matter precursors – NO_x, SO_2 and NH_3). National emission ceilings for individual pollutants for 2010 were laid down by Directive 2001/81/EC of the European Parliament and of the Council on national emission ceilings for certain atmospheric pollutants, which is based – among other things – on the relevant protocols to the **CLRTAP Convention**. The following emission ceilings are to be met by 2010: SO_2 (265 kt per year), NO_x (286 kt per year) and NH_3 (80 kt per year).

As part of the ongoing review of the Gothenburg Protocol to the CLRTAP Convention and of Directive 2001/81/EC, national emission ceilings for primary $PM_{2.5}$ particles will be set for 2020.

INDICATOR ASSESSMENT

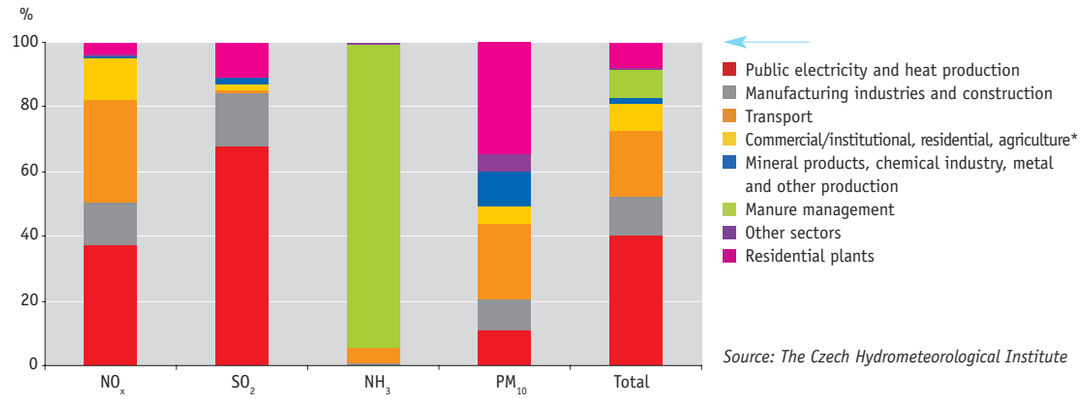
Chart 1 ➜ **The emissions of primary particles and secondary particulate matter precursors in the Czech Republic, 2003–2008* and the national emission ceilings (for NO_x, SO_2 and NH_3) for 2010 [index, 2003 = 100]**



Source: The Czech Hydrometeorological Institute

** Preliminary data. Data on PM_{10} emissions and total emissions in 2008 are not available.*

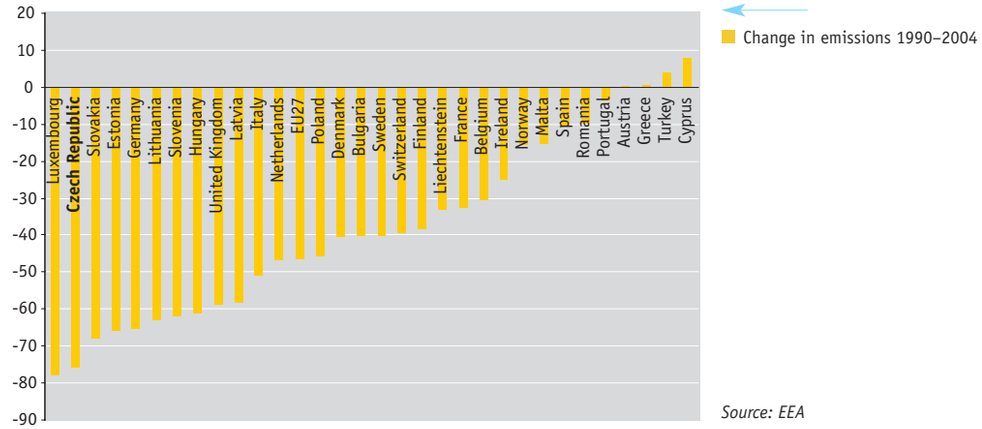
Chart 2 ➜ **Emission sources of primary particles and secondary particulate matter precursors in the Czech Republic [%], 2007**



Source: The Czech Hydrometeorological Institute

** excluding home heating (indicated separately)*

Chart 3 ➜ **Change in the emission of primary particles and secondary particulate matter precursors in 2004 compared to 1990 emission levels in selected European countries [%]**



Source: EEA

All emissions and calculated indices are based on emissions that are expressed as the 'particle formation potential'. The value of the indicator is obtained by adding up total annual emissions of primary PM_{10} and secondary particulate matter precursors in tonnes multiplied by their factor of particle formation potential. The factors of particle formation potential for the above pollutants are as follows: PM_{10} = 1; NO_x = 0.88; SO_2 = 0.54 and NH_3 = 0.64.

Primary PM_{10} particles are particles that are emitted directly from the source. Precursors of secondary particles are pollutants from which these particles may form in the atmosphere (NO_x, SO_2 and NH_3)[1].

Precursors of secondary particles contribute as much as 92% to the formation of particulates (NO_x – 56%, SO_2 – 27%, NH_3 – 9%). Between 2003 and 2008, their emissions were reduced by 15%. Following a period of mild decline after 2000, 2008 was the first year to show a significant annual decrease (11%). The decrease was equally attributable to NO_x and SO_2 (4.5%

[1] *Sources of primary particles mean combustion in stationary (the energy sector and households) and mobile sources, the abrasion of road surfaces, tires and brake pads, and repeated stirring up of particles. Secondary particles form in the atmosphere from their gaseous precursors through chemical reactions and through change from the gaseous to the liquid and solid states. The formation of secondary particles is also known as gas-particle conversion.*

and 5.6% respectively). In 2008, the emission of secondary particulate matter precursors reached 362 kt per year (expressed as the particle formation potential). In the context of relatively strong economic growth associated with annual GDP growth, the above trend can also be viewed positively.

PM_{10} emissions contribute 8% to total particulate matter formation. The emission of primary particles can only be evaluated for the 2003–2007 period. Over the said period, their production decreased by 15%.

Total particulate matter emissions, i.e. the emission of primary particles and secondary particulate matter precursors, decreased by 6% between 2003 and 2007.

The main sources of secondary particulate matter precursors are the public energy sector (electricity and heat generation, 40%) and transport (20%). The main sources of primary particulate matter emissions are residential plants (35%) and transport (23%). Within total emissions, residential plants ranks as the fifth source (7.5%), following production processes using combustion (12.5%) and manure management (8.5%). There has been no significant change in the structure of emission sources since 2003.

In economic terms, the end of 2008 was a period of sluggish growth and stagnation. One of the reasons for the annual decrease in emissions of primary PM_{10}, NO_x and SO_2 between 2007 and 2008 is reduced electricity generation. Total electricity generation in the Czech Republic decreased by 5.3% (production in steam power plants decreased by 10%). Another reason for the decrease in emissions is the reduced production in some industrial sectors (the production of non-metallic and mineral products – 3.4%; metals and metallurgical products – 2.5%; and wood products –11.6%) that are significant in terms of emissions. In addition, the decrease in emissions was also caused by reduced energy consumption in transport.

The 2008 emission levels of secondary particulate matter precursors for the entire Czech Republic are below the set ceiling. While some recommended levels of emission ceilings may have been slightly exceeded in self-governing regions, it can be assumed that even there the recommended **emission ceilings** will be met in the subsequent period.

The Thematic Strategy on Air Pollution notes that air pollution and its effects on the health and the quality of life of EU citizens are too extensive for additional legislative steps not to be taken. In connection with secondary particulate matter precursors, it proposes stricter national emission ceilings and requires greater integration of air protection aspects into other sectoral policies. Compared to 2000, the Thematic Strategy on Air Pollution envisages the following emission reductions for the European Union by 2020: SO_2 reduced by 82%, NO_x by 60% and NH_3 by 27%. In connection with primary particles, the Thematic Strategy points to the risks of both PM_{10} and fine $PM_{2.5}$ particles that are more significant in terms of health. For that reason, a percentage reduction of $PM_{2.5}$ emissions compared to 2000 will be newly set.

DATA SOURCES

- The Czech Hydrometeorological Institute
- The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
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The National Emission Reduction Programme of the Czech Republic
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The Emission Balance of the Czech Republic
http://www.chmi.cz/uoco/emise/embil/emise.html
http://issar.cenia.cz/issar/page.php?id=108

The European Environment Agency, the indicator in the international form
http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20081014123025/IAssessment1226322448209/view_content

06/ Exceedances of limit values for human health protection

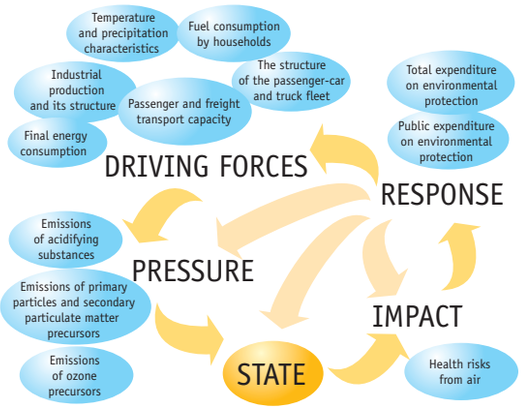
KEY QUESTION

Are limit values and target values that have been set for pollutants in order to protect human health being observed?

KEY MESSAGES

The limit values for suspended particles PM_{10} and target values for benzo(a)pyrene and ground-level ozone are regularly exceeded (depending on dispersion conditions) at a significant number of measuring stations. In heavy-traffic areas, the limit value for NO_2 is also exceeded. The limit values for benzene and sulphur dioxide and target values for cadmium and arsenic are exceeded locally. In recent years, there have been no local concentrations in excess of the limit values for carbon monoxide or lead, nor has the target value for nickel been recorded.

Despite some improvements in air quality in 2008 as a result of good dispersion conditions and reduced emissions, 42% of the population was exposed to above-the-threshold concentrations of benzo(a)pyrene and 69% to above-the-threshold concentrations of ground-level ozone in 2008. The situation regarding PM_{10} pollution improved in 2008; the 24-hour limit was exceeded in only 2.9% of the country (15% of the population). The Ostrava-Karviná region and the agglomerations of Prague and Brno have retained their status as the most affected areas in terms of air pollution.



OVERALL ASSESSMENT

Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

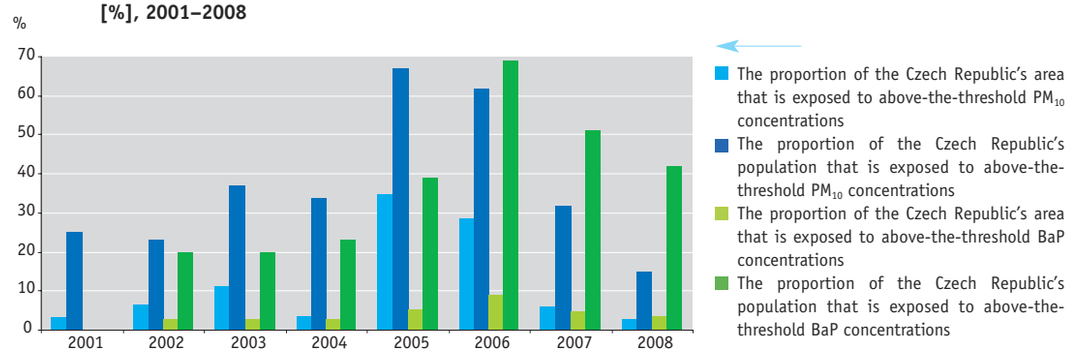
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

Priority area 3 "The Environment and the Quality of Life" within the **State Enviromental Policy** aims to minimize the burden on the human population resulting from polluted air. The State Enviromental Policy objective is to meet national and regional emission ceilings and improve air quality.

The limit values set by EU directives have been fully transposed into **national legislation**. Currently, Government Regulation No 597/2006 Coll. sets limit values for SO_2, PM_{10}, NO_2, Pb, CO and benzene. Target values have been set for ground-level ozone, cadmium, arsenic, nickel and benzo(a)pyrene. National emission ceilings are laid down by Directive 2001/81/EC that is based – among other things – on the relevant protocols to the CLRTAP Convention.

INDICATOR ASSESSMENT

Chart 1 **The percentage of the Czech Republic's area and population that were exposed to above-the-threshold 24-hour average concentrations of suspended particles PM_{10} and above-the-threshold annual average concentrations of BaP [%], 2001–2008**



Source: The Czech Hydrometeorological Institute

In 2005, the precision of the mapping methodology was improved and, for the first time, a model that combines the SYMOS model, the European EMEP model and altitude data with concentrations measured at rural background stations was used to construct maps of PM_{10} concentration fields. In terms of PM_{10} pollution, applying the SYMOS model on its own was inadequate because the model only includes emissions from primary sources. Secondary particles and re-suspended particles that are not included in emissions from primary sources are taken into account within the EMEP model.

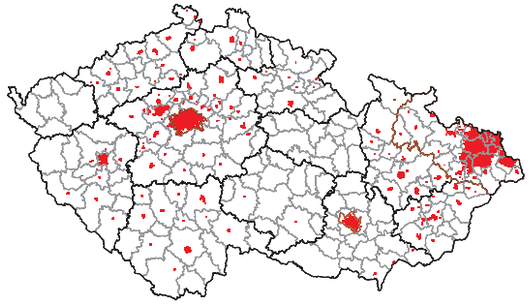
Between 2002 and 2007, the benzo(a)pyrene mapping methodology was gradually refined. In addition to increasing the number of monitoring stations, the precision of the mapping methodology was improved in 2006. In 2006, a number of towns and villages were subsequently included among those areas where the target value for BaP was exceeded.

Figure 1 ➜ **The map of the areas within the Czech Republic where health protection limit values were exceeded, 2008**

Source: The Czech Hydrometeorological Institute

- Areas with exceeded LV (3.0% of the Czech Republic)
- Areas with exceeded LV+MT (0.05% of the Czech Republic)
- Regions
- Municipalities with extended competence

Figure 2 ➜ **The map of the areas within the Czech Republic where health protection target values were exceeded (excluding ozone), 2008**



Source: The Czech Hydrometeorological Institute

- Areas with exceeded TV (3.7% of the Czech Republic)
- Regions
- Municipalities with extended competence

Air pollution adversely affects human health. In the 1990s, the Czech Republic experienced a substantial reduction in the emissions of all basic pollutants that, in turn, resulted in reduced air pollution. Despite the continued decline in emissions since 2000, **concentrations of pollutants** in the air are not decreasing. The EEA attributes that to a combination of factors (the dispersion conditions being affected by increasing temperatures and the long-range transport of pollution). Occasional fluctuations are mainly caused by dispersion conditions.

In 2008, the concentrations of certain pollutants decreased mainly because of good dispersion conditions and due to reduced total emissions (by annual comparison, SO_2 emissions fell by almost 20%, NO_x by 8% and VOC by 4% between 2007 and 2008; there was no significant change for solid pollutants). The reduction in emissions was driven by a decline in industrial and energy production. It can be assumed that once the production in those areas increases, emissions will also increase, thus increasing the subsequent concentrations of pollutants in the air.

The **main problems** with respect to air quality include pollution by suspended particles, ground-level ozone and polycyclic aromatic hydrocarbons (PAH) – expressed as benzo(a)pyrene.

Air pollution by **suspended particles** is a problem mainly in those areas with heavy traffic and concentrated industry, as well as in small settlements where solid fuels are used for heating in technically obsolete equipment.

Every year, a significant proportion of the Czech Republic's population is exposed to the effects of above the threshold concentrations of the **PM_{10}** fraction of suspended particulate matter (Figure 1). In 2008, PM_{10} concentrations decreased – the 24-hour limit was exceeded in only 2.9% of the country (15% of the population). The limit value for $PM_{2.5}$ that comes into effect in 2015 was exceeded at 9 out of 35 stations in 2008 (in 2007, at 5 out of 32).

The reason for the release of **PAH** into the air – for the purposes of evaluating their effects on human health, PAH is represented by benzo(a)pyrene (for which a target value has been set) – is the incomplete combustion of fossil fuels and some other technologies. Air pollution by benzo(a)pyrene is a problem both in areas with heavy traffic and concentrated industry and in small settlements (local combustion equipment). In 2008, the target value for benzo(a)pyrene was exceeded in 3.6% of the Czech Republic – mostly in densely populated areas with concentrated industry (the Ostrava-Karviná area) and heavy traffic (the agglomerations of Prague and Brno). Almost 42% of the population was exposed to above-the-threshold concentrations of benzo(a)pyrene (Chart 1).

Ground-level ozone has no emission source of its own in the atmosphere. It forms as a result of photochemical reactions of its precursors, NO_x and VOC. The reasons why ozone occurs over large areas include its chemistry, the long-range transport of both ozone itself and its precursors and the formation of ozone in relatively clean areas. Above-the-threshold ozone concentrations are repeatedly detected in most of the Czech Republic. Between 2001 and 2008 (the 3-year moving average), this was 70–97% of the Czech Republic. In 2008, 69% of the population in 93.8% of the territory was exposed to above-the-threshold ozone concentrations (in 2007, this was 97% of the territory).

The increasing transportation burden has translated into NO_2 limit values being exceeded at heavy-traffic locations. The set limit values for SO_2 were not exceeded in 2008. The limit value for benzene was repeatedly exceeded in Ostrava. The target value for annual average concentrations of arsenic was exceeded, similarly to the preceding year, in Ostrava and Kladno, and at the Prague-Řeporyje station of the Health Institute. In 2008, the target value for cadmium was exceeded at the Ostrava-Mariánské Hory location. In recent years, that have been no local concentrations in excess of the limit values for carbon monoxide or lead, nor has the target value for nickel been recorded.

Based on maps of the spatial distribution of the relevant air-pollution characteristics of air quality, areas with impaired air quality (Figure 1) were identified in 2008, i.e. such areas where the limit values for human health protection are exceeded for at least one pollutant (this is SO_2, CO, PM_{10}, Pb, NO_2 and benzene). In 2008, limit values were exceeded for PM_{10}, NO_2 and benzene.

In 2008, the PM_{10} limit value excluding the margin of tolerance (the 24-hour concentration) was exceeded in 2.9% of the Czech Republic, for NO_2 (the annual average concentration) this was in 0.08% of the Czech Republic and for benzene in 0.02% of the territory. In some areas within the Czech Republic, limit values were exceeded for more than one pollutant. Overall, areas with impaired air quality were identified in 3.05% of the Czech Republic in 2008 (in 2007, in 6.3%).

Based on maps of the spatial distribution of relevant air-pollution characteristics, **areas where target values are exceeded** (Figure 2) for at least one pollutant apart from ozone (these include As, Cd, Ni and benzo(a)pyrene) were identified. In 2008, target values were exceeded for As in 0.2% of the Czech Republic, for Cd in 0.005% of the Czech Republic, and for benzo(a)pyrene (the effects of local combustion equipment and industrial production) in 3.6% of the Czech Republic. In some parts of the Czech Republic, target values were exceeded for more than one pollutant simultaneously. Overall, areas in which target values were exceeded were identified in 3.7% of the Czech Republic (in 2007, in 4.9%).

In May 2008, the European Parliament adopted **Directive 2008/50/EC** on ambient air quality and cleaner air for Europe, which unifies Directive 96/62/EC with the first three daughter directives and with Council Decision 97/101/EC establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States. Among other things, this directive newly sets limit values (the limit values for local concentrations, target values, the exposure concentration obligation, national exposure reduction targets) for $PM_{2.5}$. The directive will be transposed into Czech legislation in 2010 through a new Air Protection Act. In addition to transposing the requirements of Directive 2008/50/EC, the new act is aimed at improving the effectiveness of existing instruments in order to significantly contribute to improving air quality in all regions of the Czech Republic. As an important step within the act's amendment, linkage between the act and legislation on integrated pollution prevention and other environmental components (waste, energy management) will be ensured, the application of emission ceilings will be expanded (not only to current extra large combustion sources of air pollution), it will explore toughening emission limits and technical requirements for emission sources due to increased air pollution levels will be strengthened, and an individual approach to sources will be introduced – again with regard to local air pollution levels.

Improving air quality and mitigating air quality impacts on human health and ecosystems are addressed by the Thematic Strategy on air quality (see indicators 3–5 and 33). At the national level, identifying the specific causes of poor air quality and adopting measures to improve it are addressed by the National Emission Reduction Programme of the Czech Republic, which is also the basis for regional air quality improvement programmes.

DATA SOURCE

➜ The Czech Hydrometeorological Institute

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1531)

The Czech Hydrometeorological Institute, data and maps on air pollution
http://www.chmi.cz/uoco/isko/tab_roc/tab_roc.html
http://www.chmi.cz/uoco/isko/groc/groc.html

07/ Exceedances of limit values for the protection of ecosystems and vegetation

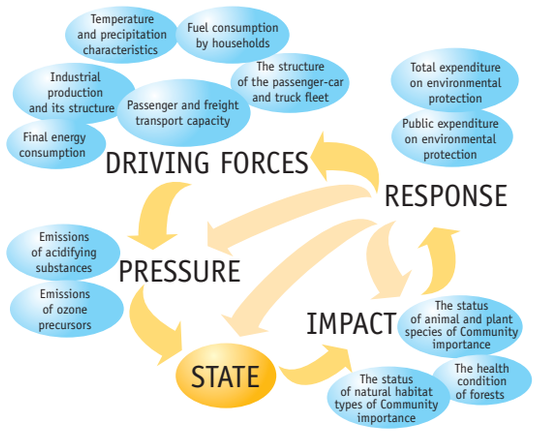
KEY QUESTION ➜

Have limit and target values for the protection of ecosystems and vegetation been exceeded?

KEY MESSAGES ➜

☹ Every year, the target value for ground-level ozone – expressed as the AOT40 index (5-year average) – is exceeded at most suburban and rural measuring stations that calculate this indicator. In 2008, AOT40 was exceeded at 67% of the measuring stations, and at 89% of the stations in 2007. Based on spatial distribution maps, it can be concluded that AOT40 has been repeatedly exceeded in most of the Czech Republic.

😐 Neither the SO_2 limit value for the protection of ecosystems and vegetation in the 2008/2009 winter period nor the annual NO_x limit for ecosystems were exceeded at any rural site. The situation was the same in 2007.



OVERALL ASSESSMENT ➜

Change since 1990	N/A
Change since 2000	☹
Last year-to-year change	☹

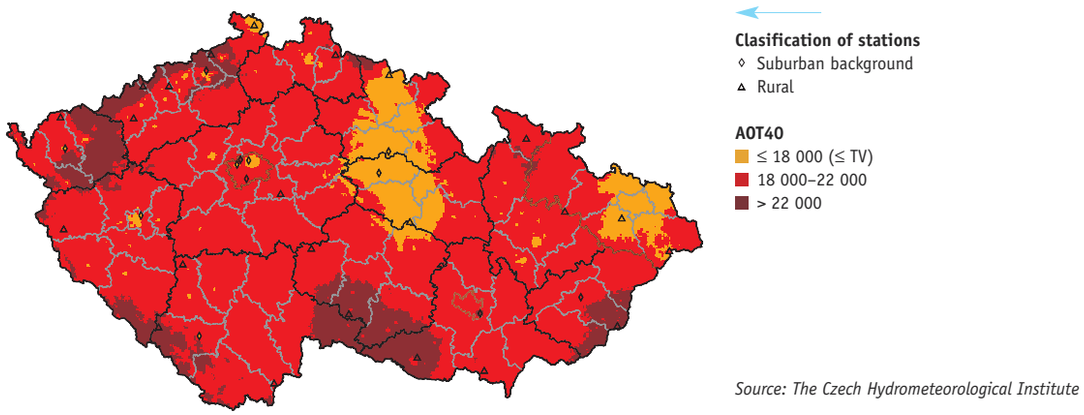
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The target value for groud-level ozone expressed as the AOT40[1] exposure index and SO_2 and NO_x limit values for the protection of ecosystems and vegetation are set by Government Regulation No. 597/2006 Coll., on air quality monitoring and assessment. The level of the target value for AOT40 is to be achieved by 31 December 2009. Indirectly, the protection of ecosystems and vegetation is affected by all documents addressing the issue of air pollution, i.e. the **National Emission Reduction Programme of the Czech Republic**.

Reducing the emissions of ground-level ozone precursors (NO_x, VOC) and the environmental impact of ozone is addresses by protocols to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) (in particular, the **Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone**, the 'Gothenburg Protocol').

INDICATOR ASSESSMENT

Figure 1 ➜ **The field of the values of the AOT40 index, a five-year average [µg.m^{-3}.h], 2004–2008**

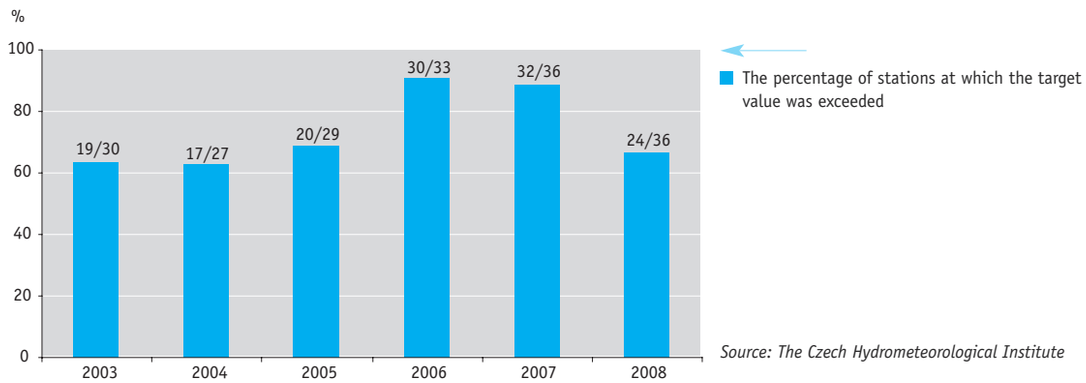


Source: The Czech Hydrometeorological Institute

[1] *The cumulative exposure to AOT40 ozone is calculated as the sum of the differences between the hourly ozone concentration and the threshold level of 80 µg.m^{-3} (= 40 ppb) for each hour in which this threshold value was exceeded. According to the requirements of Government Regulation 597/2006 Coll., AOT40 is calculated for a period of three months from May to July using ozone concentration measurements taken each day between 8:00 and 20:00 CET (= 7:00 to 19:00 UTC).*

Atmosphere and Climate

Chart 1 ➜ **The percentage of stations at which the target value – expressed as AOT40 (5-year average) – for the protection of vegetation was exceeded [%], 2004–2008**



Source: The Czech Hydrometeorological Institute

The number in the Chart indicates the number of stations at which the target value has been exceeded (before the slash) out of the total number of stations (after the slash). These are rural and suburban stations for which AOT40 calculation is relevant under the legislation.

Generally, ozone concentrations increase with altitude, with the highest levels occurring in mountain areas. The action of ground-level ozone may result in damage to and reduced growth of agricultural crops, forests and plants. For the purposes of assessing the protection of vegetation against excessive ozone concentrations, national legislation uses the AOT40 exposure index – in compliance with the relevant EU directive.

Year-to-year changes in **the level of the AOT40 exposure index** are affected by the volume of ozone precursor emissions, but more particularly by meteorological parameters (temperature, precipitation, solar radiation) in the period from May to July for which the indicator is calculated. During the 2004–2008 period, the highest levels were recorded in 2006 (if we evaluate individual years), when high temperatures, high levels of solar radiation and low precipitation were measured over long periods.

According to the assessment for 2008 (using an average for the years 2004–2008), the ozone **target value for the protection of vegetation was exceed** at 24 sites of the total number of 36 rural and suburban stations for which AOT40 calculation is relevant under the legislation. In this regard, there was an annual improvement – the assessment for 2007 (an average for the years 2003–2007) put the number of stations where AOT40 had been exceeded at 32 out of 36 stations. The improvement is connected with a decrease in ozone precursor emissions of about 7% in 2008 as compared to 2007. The decrease is also connected with the fact that the assessment for the 2004–2008 period no longer included the very warm and dry year of 2003 in which very high concentrations of ground-level ozone were measured. In spite of that, achieving the level of the target value by 31 December 2009 is clearly unrealistic.

The distribution of AOT40 levels is shown in Figure 1. In 2008, the ozone AOT40 target value for the protection of ecosystems and vegetation was repeatedly exceeded in almost all of the Czech Republic (Figure 1) with the exception of some large areas in the Hradec Králové, the Pardubice and the Moravian-Silesian Regions.

Neither the SO_2 limit value for the protection of ecosystems and vegetation in the 2008/2009 winter period nor the annual **SO_2 and NO_x** limits for ecosystems and vegetation were exceeded at any rural site. The situation was comparable to 2007.

Environmental measures within the Thematic Strategy on air protection and the subsequent lowering of the national emission ceilings for ozone precursors for 2020 will also be beneficial in terms of reducing the size of the areas where damage to ecosystems due to air pollution may occur.

DATA SOURCE

➜ The Czech Hydrometeorological Institute

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1584)

08/ Total water abstraction

KEY QUESTION ➜

Is water in the Czech Republic being used efficiently?

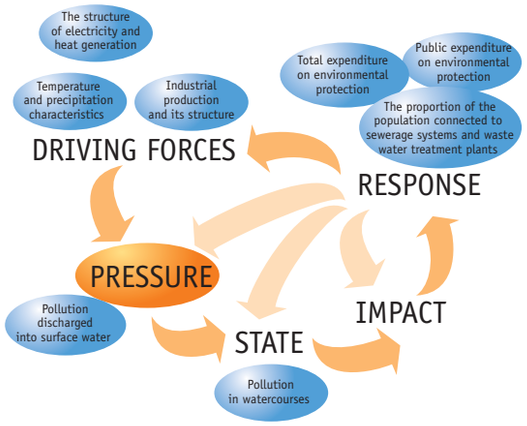
KEY MESSAGES ➜

With regards to water abstraction for public and industrial water supply systems, it can be concluded that the trend of declining water abstraction continued after 2000, even though at a slower pace than it had in the 1990s.

The Czech Republic's State Environmental Policy's objective to ensure quality water supply for 91% of the population by 2010 was accomplished in 2004 and the proportion has continued to increase. The Czech Republic's State Environmental Policy's objectives with regard to reducing the consumption of water from public water supply systems are also being fulfilled.

Since 2002, the declining trend in the development of total water abstraction has changed to fluctuation or stagnation.

Between 2000 and 2007, drinking water losses in the distribution system decreased from 25.2% to 18.6%. However, 2008 showed an increase to 19.4%.



OVERALL ASSESSMENT ➜

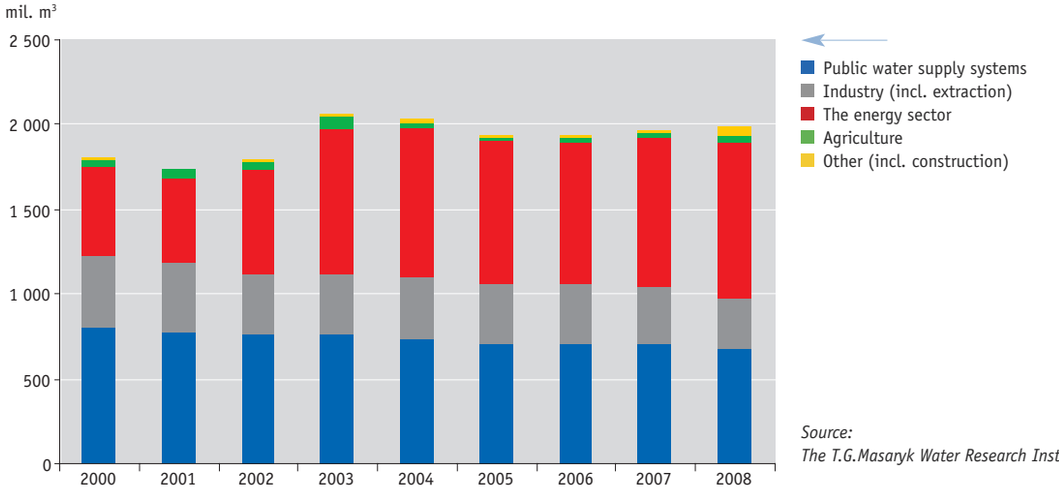
Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Allowing for the sustainable use of water resources is one of the long-term objectives of the **Czech State Environmental Policy.** This is connected with requirements to decrease total water abstraction per capita and in particular water abstraction for public water supply systems. Speeding up the renewal of failing and obsolete water supply networks is one of the framework objectives for water management services within the **Plan of Major River Basins of the Czech Republic.**

INDICATOR ASSESSMENT

Chart 1 ➜ **Water abstraction by individual sectors in the Czech Republic [million m³], 2000–2008**

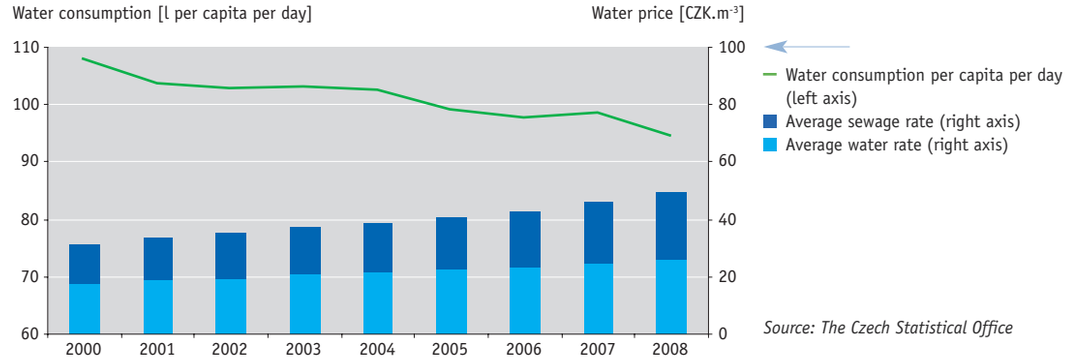


Source: The T.G.Masaryk Water Research Institute

Water abstraction by users in excess of 6000 m³ per year or 500 m³ per month is kept on record – pursuant to Section 10 of Decree of the Ministry of Agriculture No 431/2001 Coll.

Water management and water quality

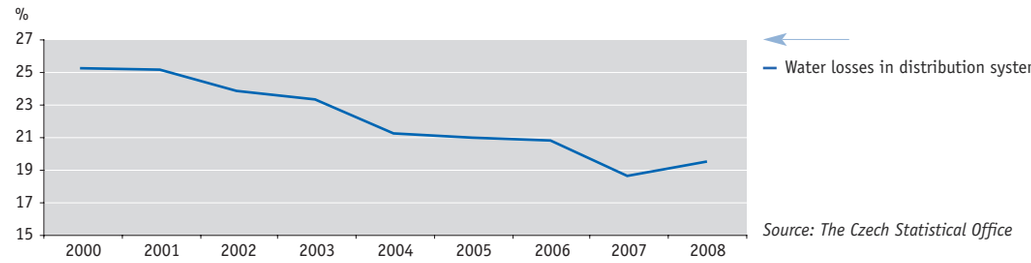
Chart 2 ➜ **Water consumption by households in the Czech Republic [l per capita per day] and the price of water [CZK per m³], 2000–2008**



Source: The Czech Statistical Office

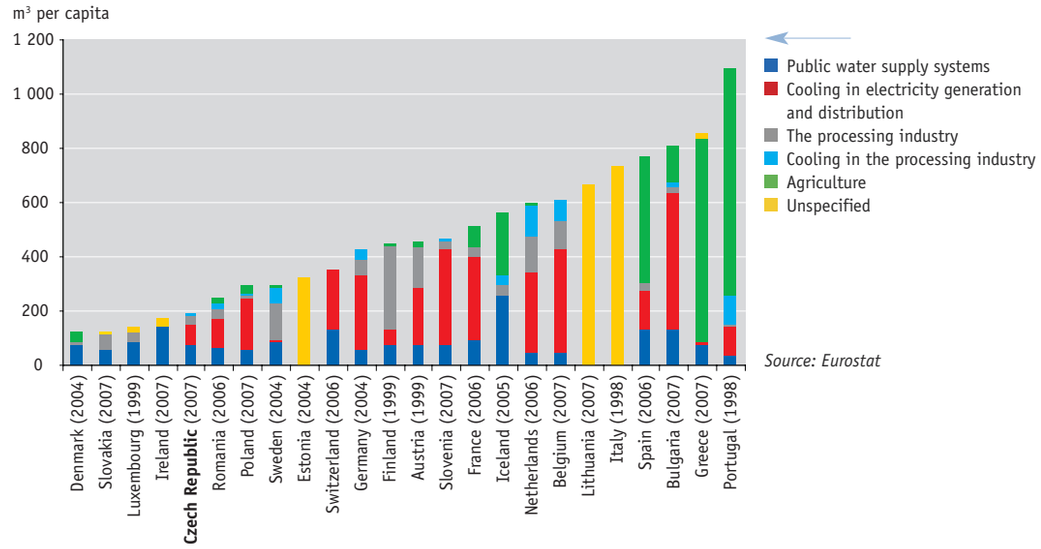
Water consumption per capita per day indicates the amount of invoiced water per one inhabitant that is supplied with water from a public water supply system per one day. Up until 2003 (incl.), water and sewage rates are only indicated for main operators, since 2004 the figures have been calculated for the entire Czech Republic. Water and sewage rates are shown exclusive of VAT.

Chart 3 ➜ **Water losses in distribution systems in the Czech Republic [%], 2000–2008**



Source: The Czech Statistical Office

Chart 4 ➜ **An international comparison of water abstraction [m³ per capita]**



Source: Eurostat

The data relate to the most recent year for individual states (indicated in brackets in the chart) in the Eurostat database.

The marked long-term reduction in **total water abstraction**, which occurred in the context of declining industrial production due to the restructuring of the national economy and a reduced demand for water due to technological changes in the period after 1990, peaked at the end of the 1990s. With the start of the next decade, the decline was replaced by fluctuating or stagnant trend of development (Chart 1). Individual sectors account for differing proportions of water abstraction (1 989.5 million m^3 in 2008). Most water is abstracted for the energy sector (46%), followed by public water supply (34%) and industry (15%). Water abstraction in agriculture is traditionally low (2%).

Throughout the 1990s, the decrease in **water abstraction for the energy sector** was mainly influenced by reduced production and the shutdown of some thermal power plants. The sharp increase in 2002 and 2003, which also significantly affected total water abstraction, was largely caused by the start of the Temelín nuclear power plant's operation and the resumption of abstraction for once-through cooling at the Mělník power plant. In the subsequent period, water abstraction for the energy sector more or less stagnated, yet it has grown slightly since 2006. However, most of that abstraction is only used for once-through cooling of steam turbines, with the quality of the discharged cooling water remaining unchanged. On the other hand, such water increases the temperature of the receiving water bodies. In addition, the category entitled 'other', which also includes **construction**, displayed a moderate annual (2007/2008) increase in abstraction as well. Water abstraction for **agriculture** is influenced in particular by irrigation, the fluctuation in water abstraction is mainly due to the variability in rainfall and the temperature conditions of the given year – these were more or less normal in 2008. By comparison to the previous four years, only a slight increase in water abstraction was recorded in agriculture in 2008.

With regards to **water abstraction for public and industrial water supply systems**, it can be concluded that the trend of declining water abstraction continued after 2000 – in the case of public abstraction, this was due to reduced drinking water consumption and reduced losses in distribution systems. In the case of industry, this was mainly due to the use of new technologies. However, the decline is more gradual than in the 1990s, especially the early 1990s. The year to year (2007/2008) decrease in water abstraction for public use from surface sources, which require more intensive processing into drinking water than underground sources, can be regarded as positive. The development in water abstraction for public water supply systems is connected with the decreasing amount of **water that is produced for public use**.

In 2008, the actual amount of invoiced water was 516 million m^3, of which 64% was supplied to households. Despite that, the **number of supplied inhabitants** has been growing consistently over the long-term. In 2008, a total of 9.7 million inhabitants were supplied with drinking water, representing 92.7% of the Czech Republic's population. The decline in the amount of produced water is mainly due to reduced **drinking water losses** in distribution systems (Chart 3). After 2000, losses were reduced from 25.2% to 18.6% in 2007. However, between 2007 and 2008, there was a year-to-year increase, with the losses reaching 19.4%. The reduction in water abstractions was thus largely due to lower water consumption. From 2000 to 2008, **water consumption by households** (Chart 2) showed a slight decrease from 107.6 to 94.2 litres per capita per day. With respect to increasing **water rates** (Chart 2), the linear growth from recent years was continued with a year-to-year increase of 6.5%.

Compared to other European countries (Chart 4), the Czech Republic's total water abstraction per capita is below average, totalling 190 m^3 per capita per year. The situation is particularly problematic in southern European countries, i.e. not only due to extreme abstraction levels totalling as much as 700–1 100 m^3 per capita per year, but also due to a lack of water resources. In these areas, a large proportion of water is used for irrigation.

DATA SOURCES

- The Czech Statistical Office
- The T. G. Masaryk Water Research Institute (a public research institution)
- The Ministry of Agriculture
- Podniky povodí, state enterprises
- The European Environment Agency (EEA)
- Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1573)

The European Environment Agency, international indicators (CSI 018)
http://themes.eea.europa.eu/IMS/CSI

Water Supply, Sewerage and Watercourses in 2008, The Czech Statistical Office tables
http://www.czso.cz/csu/2009edicniplan.nsf/publ/2003-09-v_roce_2008

The Report on the State of Water Management in the Czech Republic in 2008
http://mze.cz

09/ Pollution discharged into surface water

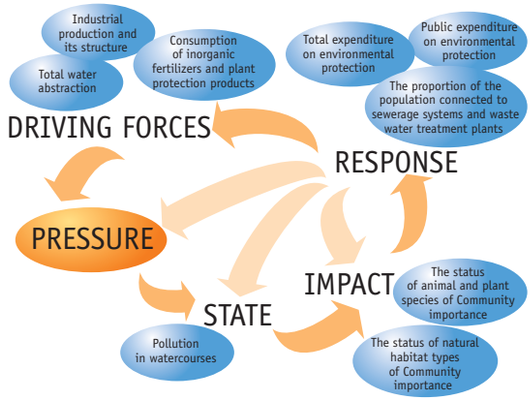
KEY QUESTION

Have we succeeded in reducing the amount of pollution discharged by point sources that pollute surface water in the Czech Republic?

KEY MESSAGES

Between 1993 and 2008, there was an overall decrease in pollution discharged by point sources in the Czech Republic – in the BOD_5 indicator by 92%, in COD_{Cr} by 86% and in undissolved substances by 89%. The most significant decrease in the amount of discharged pollution occurred in the 1990s, mainly due to the restructuring of the national economy and also due to the extensive construction and modernization of waste water treatment plants.

The trend since 2003 has been gradually positive – ensuring waste water treatment in a larger number of smaller municipalities has been more time-consuming and expensive than was the case with larger pollution sources.



OVERALL ASSESSMENT

Change since 1990	
Change since 2000	
Last year-to-year change	

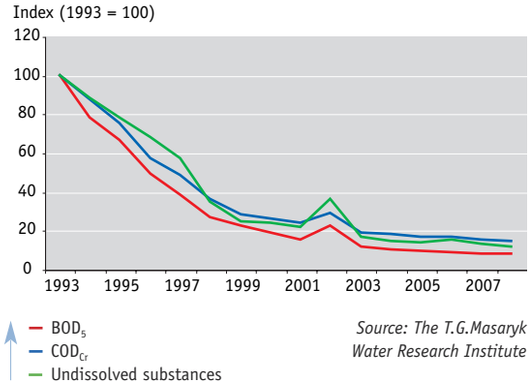
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

Reducing the amount of pollution discharged into water is the principal method for improving water quality. The requirements under **Water Framework Directive 2000/60/EC** include the setting of emission limits for individual pollution indicators. Emphasis is also placed on minimizing the entry of nutrients and hazardous substances into the aquatic environment. Likewise, **national strategic documents** highlight the need to reduce the entry of pollutants into water, mainly through promoting the construction and modernisation of waste water treatment plants in accordance with the requirements of Council Directive 91/271/EEC concerning urban waste-water treatment. Among other things, the **Plan of Major River Basins of the Czech Republic** stresses the need to introduce best available techniques into production processes and best available technologies into waste water disposal.

The indicators and the values for the permissible pollution of waste water from point sources and the requirements for permitting discharge of waste water into surface water and into sewerage systems are laid down by Government Regulation No 61/2003 Coll. as amended by Government Regulation No 229/2007 Coll. At the same time, the **government regulation** anchored within the Czech legal system the Czech Republic's decision from the EU accession treaties to define the entire territory of the Czech Republic as a sensitive area.

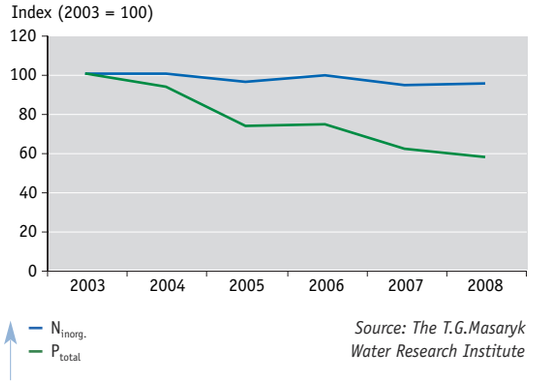
INDICATOR ASSESSMENT

Chart 1 **Discharged pollution in relative terms – the BOD_5, COD_{Cr} and undissolved substances indicators [index, 1993 = 100], 1993–2008**



Source: The T.G.Masaryk Water Research Institute

Chart 2 **Discharged pollution in relative terms – the $N_{inorg.}$ and P_{total} indicators [index, 2003 = 100], 2003–2008**



Source: The T.G.Masaryk Water Research Institute

The trend of the amount of pollution discharged by point sources into surface water is assessed using five basic indicators and it expresses the discharged amount of a given pollutant that affects the quality of surface water. Organic pollution is expressed through the BOD_5, COD_{Cr} and undissolved substances indicators; nutrients are represented by $N_{inorg.}$ and P_{total}.

Between 1993 and 2008, the total level of **pollution discharged by point sources** decreased in the **BOD_5** indicator by 92.4% to 7 736 t in 2008, **COD_{Cr}** by 85.7% to 45 482 t in 2008 and **undissolved substances** by 88.7% to 13 895 t in 2008 (Chart 1). While in the first half of the 1990s the decline in the amount of pollution in waste water that was discharged into watercourses was mainly due to reduced production, the effects of extensive construction and technological modernisation of waste water treatment plants have been increasingly felt ever since the mid 1990s. Since 2003 (2002 was affected by catastrophic floods), the trend has been gradually positive. Compared to 2007, discharged pollution decreased for the BOD_5 indicator by 122 t (by 1.6%), for COD_{Cr} by 3 392 t (by 6.9%) and for undissolved substances by 2 179 t (by 13.6%) in 2008. The reduction occurred in almost all river basins, with the exception of the BOD_5 indicator in the Elbe and the Morava River basins. The amount of pollution flowing into waste water treatment plants has shown little change that would be of statistical significance, with the production of the above pollutants being more or less stagnant since 2003. By year-to-year comparison (2007/2008), the amount of produced pollution only decreased by 5.9% for the undissolved substances indicator. Given that major pollution sources already have newly-built or modernised waste water treatment plants, reducing the amount of discharged pollution is slower since it involves smaller sources.

In the 1990s, nutrients – **nitrogen and phosphorus** – also saw a significant reduction in the **amount of pollution discharged by point sources** (Chart 2). The reduction was mainly attributable to the fact that both biological nitrogen removal and biological and chemical phosphorus removal are specifically applied in waste water treatment technology within new and intensified waste water treatment plants. Since 2003, there has been a gradual decrease in the amount of discharged nutrients. By year-to-year comparison to 2007, the amount of discharged pollution decreased by 73 t (by 6.5%) for the P_{total} indicator and slightly increased by 136 t (by 1%) for the $N_{inorg.}$ indicator. In 2008, the amount of discharged pollution totalled 1 047 t for the P_{total} indicator and 14 193 t for $N_{inorg.}$. The reduction in discharged phosphorus is partly attributable to the prohibition of launching laundry detergents with phosphorus concentrations greater than 0.5% on the market that was imposed by Decree No 78/2006 Coll. in the Czech Republic as of October 2006. While a voluntary agreement on phosphate-free products (with phosphorus concentrations to 0.1%) has been in place since 2005, not all producers joined it.

Significant pollution sources, particularly with regards to nitrates, pesticides and phosphorus, also include **non-point sources** – farming and erosion in the landscape. The amount of these substances that gets into water is also affected by the dosing of fertilizers and the application of substances used for plant protection in agricultural production, as well as the conditions for the erosion of agricultural land.

Because major pollution sources (industrial enterprises, all towns with a population equivalent of more than 10 000) already have newly-built or modernized waste water treatment plants, only a gradual reduction in pollution discharged by point sources can be expected **in the future**. This is because providing waste water treatment to smaller municipalities is more time-consuming and expensive and it covers fewer people than larger cities. Due to the requirement for tertiary-stage treatment in the construction of new waste water treatment plants and in the modernization of existing waste water treatment plants, a continued reduction in discharged nutrients can be expected. In addition, the completion of the modernization and intensification of the Central Waste Water Treatment Plant in Prague should also help to reduce the amount of discharged pollution.

DATA SOURCES

➜ The T. G. Masaryk Water Research Institute (a public research institution)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1577)

The European Environment Agency, international indicators (WEU 08, WEU 09)
http://www.eea.europa.eu/themes/water/indicators

The methodological guideline of the Ministry of the Environment's Department of Water Protection to Government Regulation No 229/2007 Coll.

The Report on Water Management in the Czech Republic in 2008
http://mze.cz

Water management and water quality

10/ Pollution in watercourses

KEY QUESTION ➜

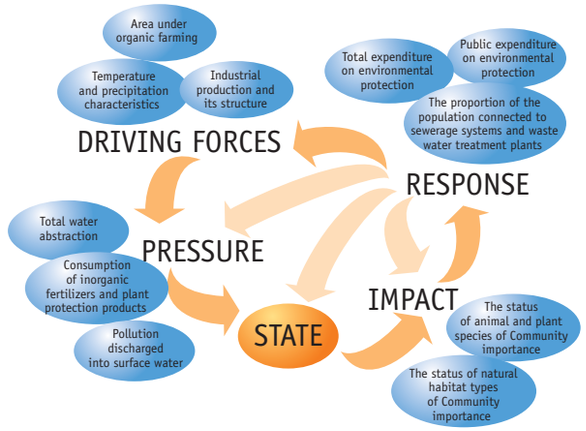
What progress has been made in improving the quality of water (affecting both aquatic organisms and the use of water) in the Czech Republic's watercourses?

KEY MESSAGES ➜

Between 1993 and 2008, the annual average concentrations of all selected pollution indicators (BOD_5, COD_{Cr}, $N\text{-}NO_3^-$, P_{total}, AOX, Cd, FCOLI) in watercourses decreased. In addition, there was a reduction in the proportion of profiles at which limit values for indicators of permissible surface water pollution pursuant to Government Regulation No 61/2003 Coll., as amended, had been exceeded; the limit values are to be achieved by the end of 2015.

During the first decade of the 21st century, the average concentrations of most of the above pollutants only showed a mild decrease or even stagnated.

Even though there has been a decrease in the proportion of profiles at which limit values for indicators of permissible surface water pollution are exceeded (with the exception of AOX), the limit values continue to be exceeded in a relatively large number of the profiles.



OVERALL ASSESSMENT ➜

Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

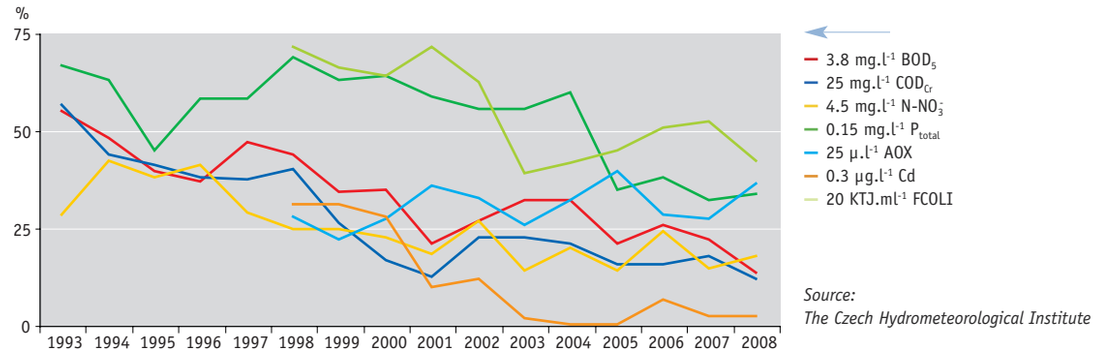
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The basic requirements for improving water quality are based on **Water Framework Directive 2000/60/EC**. One of the main objectives is to achieve a 'good status' of surface water bodies. This should be accomplished through selecting appropriate measures and quality objectives.

Under the current **national legislation**, limit values for indicators of permissible surface water pollution are laid down by Government Regulation No 61/2003 Coll. as amended by Government Regulation No 229/2007 Coll., and are expressed as C90[1]. The corresponding annual arithmetic averages for the general requirements for limit values are laid down by the methodological guideline of the Ministry of the Environment's Department of Water Protection to the above government regulation. Meeting the limit values is obligatory by the end of 2015.

INDICATOR ASSESSMENT

Chart 1 ➜ **The proportion of profiles at which limit values for indicators of permissible pollution of Czech surface water bodies were exceeded [%], 1993–2008**

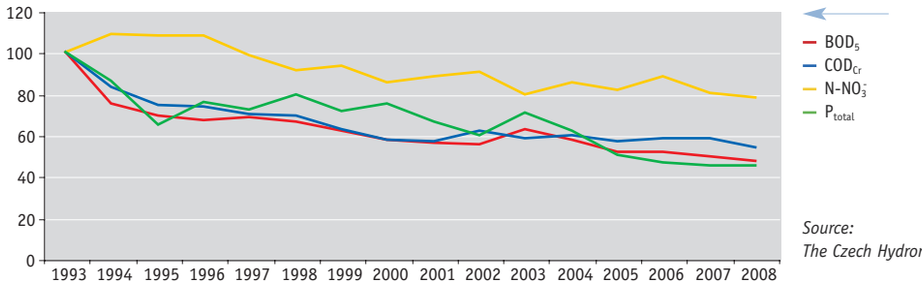


Source: The Czech Hydrometeorological Institute

Note on the methodology: The percentage of profiles within the Eurowaternet network (73 stations) that exceeded the corresponding annual average general requirements for the limit values for indicators of permissible surface water pollution pursuant to the methodological guideline to Government Regulation No 61/2003 Coll. as amended by Government Regulation No 229/2007 Coll.
The limit values for individual indicators are listed in the legend for Chart 1 and were used retrospectively for all years that are shown in the chart.

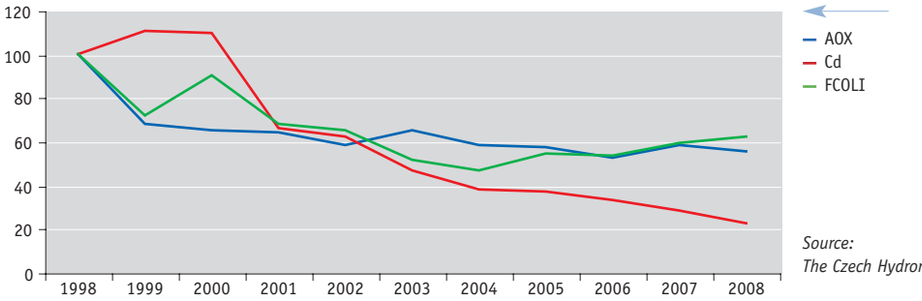
[1] *A concentration level that is 90% likely not to be exceeded.*

Chart 2 ➜ **The concentrations of the pollution indicators of Czech watercourses [index, 1993 = 100], 1993–2008**



Source:
The Czech Hydrometeorological Institute

Chart 3 ➜ **The concentrations of the pollution indicators of Czech watercourses [index, 1998 = 100], 1998–2008**

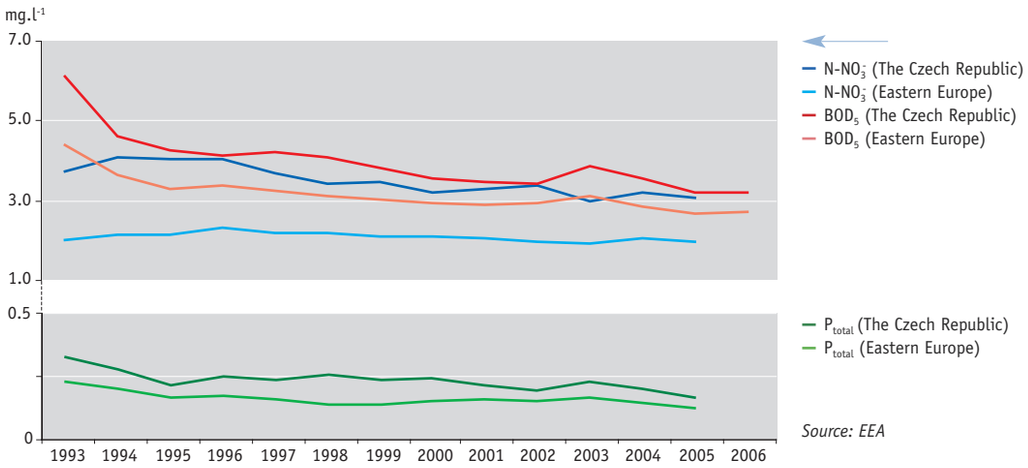


Source:
The Czech Hydrometeorological Institute

Note on the methodology to Charts 2 and 3: The indices for individual indicators against the selected base year were calculated with arithmetic means for each year using annual average values for individual profiles within the Eurowaternet network (73 stations).

Note on the methodology to Charts 1 to 3: Available data from 73 profiles within the Eurowaternet network were used – Waterbase-Rivers:Stations, (http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=1081) – the specific number of profiles with available data for individual indicators and years can be found in the ISSaR.

Chart 4 ➜ **A comparison of the average levels of concentrations of pollution indicators in watercourses in the Czech Republic and in Eastern Europe [mg.l^{-1}], 1993–2006**



Source: EEA

The average for Eastern Europe is expressed as the average – weighted by the number of profiles in the Eurowaternet network – of annual average concentrations in the following countries: The Czech Republic, Slovakia, Estonia, Latvia, Lithuania, Hungary, Slovenia, Bulgaria (except for BOD_5), Poland (except for BOD_5).

Water management and water quality

The quality of watercourses is assessed using the concentrations of seven selected basic pollution indicators. Organic pollution is expressed using the BOD_5 and the COD_{Cr} indicators, nutrients are represented by $N\text{-}NO_3^-$ and P_{total}, and cadmium (Cd) was selected for heavy metals. Over the long term, the worst-classified substances include absorbable organically bound halogens (AOX) that are a general indicator and microbiological indicators represented by thermo-tolerant (faecal) coliform bacteria (FCOLI).
In terms of reducing the amount of pollution discharged by point sources, relatively good progress has been made both in reducing the concentrations of and in preventing exceedances of the limit values for **organic pollutants and total phosphorus** (Charts 1 and 2: BOD_5, COD_{Cr}, P_{total}). In 2008, the average concentrations calculated for indicators that were measured at profiles within the Eurowaternet network in the Czech Republic equalled 2.87 mg.l^{-1} for BOD_5, 18 mg.l^{-1} for COD_{Cr} and 0.14 mg.l^{-1} for P_{total}. The improvement of water quality was significantly affected by the restructuring of industry and industrial technologies, especially in the first half of the 1990s. Subsequently, the construction and the modernization of sewerage systems and both industrial and municipal waste water treatment plants helped to improve water quality. Regarding nutrient removal from waste water, the addition of tertiary-stage treatment is applied. The decrease in phosphorus inputs was facilitated by restrictions on the use of phosphates in laundry detergents that has been in effect since October 2006. Nevertheless, the corresponding annual average for the limit value for phosphorus pursuant to Government Regulation No 61/2003 Coll. was exceeded at 33% of the Eurowaternet profiles in the Czech Republic in 2008. Since 1991, the use of phosphate fertilizers in agriculture has stagnated. **Nitrate** concentrations showed a gradual decline in the 1990s and a have been more or less stagnant since 2000 (Chart 2: $N\text{-}NO_3^-$), 2.88 mg.l^{-1} in 2008. There has been little success in reducing nitrate concentrations, largely due to surface pollution that is connected with the increasing application of nitrogen agricultural fertilizers. The stagnation in nitrogen discharges by point pollution sources also played a role.

Of the above pollution indicators, the most pronounced positive trend was displayed by **cadmium** (Charts 1 and 3: Cd), a hazardous substance. In 2008, the above limit value for cadmium was only slightly exceeded at one profile and it can be assumed that it will not be exceeded in the future. In 2008, the average concentration was 0.07 mg.l^{-1}.
Pollution from **AOX and FCOLI** (Charts 1 and 3) has been developing rather unfavourably. While the average concentration of AOX has slightly decreased (to 24.7 mg.l^{-1} in 2008) since 1998, the proportion of Eurowaternet profiles in the Czech Republic at which the annual average for the corresponding limit value pursuant to Government Regulation No 61/2003 Coll. is exceeded has increased. With respect to the average concentrations of FCOLI, in 2004 there was a reversal of the trend from a gradual decline to a gradual increase. Despite a significant decrease relative to 1998, 42% of the Eurowaternet profiles in the Czech Republic still exceed the limit value for the average concentrations of the FCOLI indicator.
When assessing water quality based on ČSN 75 7221, water quality has improved in all indicator groups A–D, which is also confirmed by the gradual improvement in surface water quality compared to 2007. However, despite the gradual improvement in water quality, there are still portions of some watercourses that are classified as Class V according to the basic classification of indicators that were monitored in 1991.
If we **compare the average concentrations** of the nitrates, the BOD_5 and the total phosphorus indicators (Chart 4) from Eurowaternet stations in the Czech Republic and in Eastern European countries (one of which is the Czech Republic), the average concentrations of the above indicators are higher in the Czech Republic. However, average concentrations are also influenced by the specific conditions of watercourses, especially their flow rates. The declining trend is comparable. Generally, the best quality water is found in Northern Europe. Concentrations in the Czech Republic are similar to average concentrations in Western European countries.

DATA SOURCES

- ➜ The Czech Hydrometeorological Institute
- ➜ The T. G. Masaryk Water Research Institute (a public research institution)
- ➜ The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1579)

The European Environment Agency, international indicators (CSI 019, CSI 020)
http://themes.eea.europa.eu/IMS/CSI

The methodological guideline of the Ministry of the Environment's Department of Water Protection to Government Regulation No 229/2007 Coll.

The Report on the State of Water Management in the Czech Republic in 2008
http://mze.cz

The Hydrological Yearbook of the Czech Republic 2008
http://www.chmi.cz

IS ARROW
http://hydro.chmi.cz/arrowdb_p/index.php

11/ Proportion of the population connected to sewerage systems and waste water

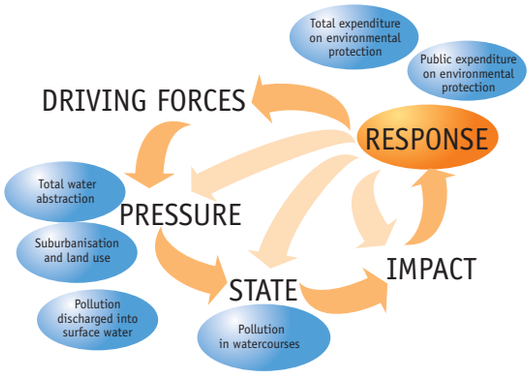
KEY QUESTION ➜

How much of the Czech Republic's population is connected to sewerage systems and waste water treatment plants?

KEY MESSAGES ➜

Between 2000 and 2008, sewerage systems in the Czech Republic were extended by 80%, thereby increasing the proportion of the population connected to sewerage systems from 75 to 81%. Sewerage systems and waste water treatment plants were built in all major towns and cities and, in recent years, the main focus has been on building sewerage systems and waste water treatment plants in municipalities of 2 000–10 000 population equivalent and on modernizing existing waste water treatment plants.
The progress in waste water treatment is mainly illustrated by the growing number of waste water treatment plants (which has nearly doubled since 2000) and the associated increase in the proportion of the population connected to sewerage systems ending in waste water treatment plants.

Since 2000, the proportion of waste water discharged into sewerage systems that is treated has stagnated at 94–96%.
Taking account of the need to implement the requirements of Directive 91/271/EEC, the year-to-year increase in the number of waste water treatment plants over 2 000 population equivalent can be regarded as relatively small.



OVERALL ASSESSMENT ➜

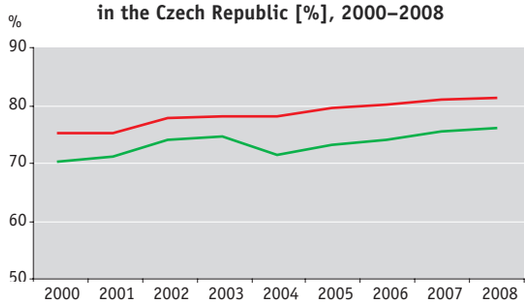
Change since 1990	
Change since 2000	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Requirements for waste water treatment that follow from **Council Directive 91/271/EEC** and their fulfilment are important objectives set by the **State Environmental Policy of the Czech Republic**. The requirements include constructing missing water management infrastructure (particularly waste water treatment plants and sewerage systems), modernizing and improving the technology of waste water treatment in all agglomerations with a greater than 2 000 population equivalent within a transition period, i.e. by the end of 2010. For 54 selected agglomerations with a greater than 10 000 population equivalent, waste water treatment had to be ensured by the end of 2006. Furthermore, according to the State Environmental Policy of the Czech Republic, the desirable trend includes increasing the proportion of the population connected to public sewerage systems and increasing the proportion of the population connected to sewerage systems ending in waste water treatment plants.

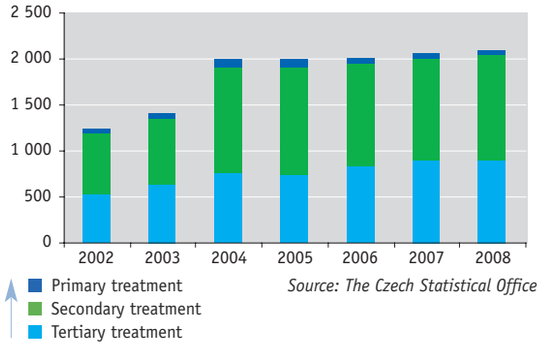
INDICATOR ASSESSMENT

Chart 1 ➜ **The proportion of the population connected to sewerage systems and to sewerage systems ending in waste water treatment plants in the Czech Republic [%], 2000–2008**



Source: The Czech Statistical Office

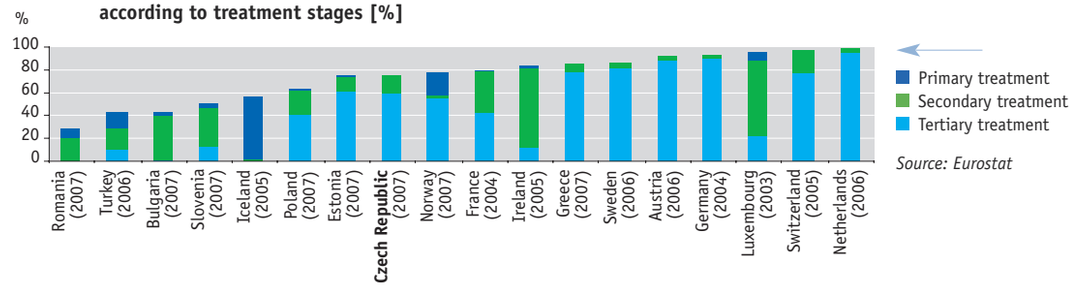
Chart 2 ➜ **The number of waste water treatment plants according to treatment stages in the Czech Republic, 2002–2008**



Source: The Czech Statistical Office

primary treatment = mechanical waste water treatment plants; secondary treatment = mechanical-biological waste water treatment plants without nitrogen or phosphorus removal; tertiary treatment = mechanical-biological waste water treatment plants with further nitrogen or phosphorus removal

Chart 3 ➜ **An international comparison of the proportion of the population connected to waste water treatment plants according to treatment stages [%]**



Source: Eurostat

The data relate to the most recent year (indicated in brackets in the chart) for the given state in the Eurostat database.

Waste water treatment reduces the amount of discharged pollution and is therefore an essential tool for improving surface water quality. Since 1990, the length of sewerage systems in the Czech Republic has more than doubled, thus increasing the proportion of the population connected to public sewerage systems from 72 to 81.1% in 2008 (Chart 1). By year-to-year comparison (2007/2008), sewerage systems were extended by 1 015 km to 38 704 km and the population connected to **sewerage systems** consequently increased by 1.4 % to 8.5 million people. The extension of sewerage systems is more extensive than the increase in the connected population because both waste water treatment plants and sewerage systems have mostly already been built in larger cities and it is now necessary to gradually cover smaller municipalities in which the concentration of the population is lower.
Even today, not all waste water that is discharged into sewerage systems is treated. Over the monitored period since 2000, **the proportion of waste water** that is discharged into sewerage systems and **that is treated** has stagnated at 94–96%. According to data from the Czech Statistical Office, 95.3% of the 509 million m³ of waste water discharged into sewerage systems was treated in 2008 (in 1990, the proportion was only 75%).
Compared to 2007, the total **number of waste water treatment plants** in the Czech Republic increased by 26 to 2 091 waste water treatment plants, excluding domestic waste water treatment plants (Chart 2). Due to the construction and the modernization of waste water treatment plants, the number of waste water treatment plants with nitrogen or phosphorus removal increased by 12, the number of waste water treatment plants with basic mechanical-biological treatment by 21, while the number of only mechanical treatment plants decreased by 7. If we look at **waste water treatment plants with a capacity greater than 2 000 population equivalent**[1], 5 new municipal waste water treatment plants and one neutralization station were completed in 2008. In the category of greater than 2 000 population equivalent, 24 municipal waste water treatment plants, 4 industrial waste water treatment plants and 1 neutralization station were either modernized or extended.
The Czech Republic has a very high average **waste water treatment plants efficiency** (i.e. the ratio between the amount of pollution at the inflow and at the outflow) for BOD_5 and undissolved substances – with up to 97% of all pollution being removed. The efficiency for COD_{Cr} is about 94%, for total phosphorus 85% and for nitrogen compounds 70%. The values are similar to those in previous years, which is connected with the fact that the modernization of large waste water treatment plants is virtually complete and the amount of pollution produced by individual agglomerations has stabilized.
The construction of new sewerage systems and waste water treatment plants has translated into a continuing increase in **the proportion of the population connected to sewerage systems ending in waste water treatment plants**. This figure reached 75.7% in 2008 (Chart 1) – this is consistent with the objectives set by the State Environmental Policy of the Czech Republic. By international comparison (Chart 3), countries of Northern and Western Europe are generally doing better.

DATA SOURCES

- ➜ The Czech Statistical Office
- ➜ The T. G. Masaryk Water Research Institute (a public research institution)
- ➜ The European Environment Agency (EEA)
- ➜ Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1575)

The European Environment Agency, international indicators (CSI 024)
http://themes.eea.europa.eu/IMS/CSI

Water Supply, Sewerage and Watercourses in 2008, The Czech Statistical Office tables
http://www.czso.cz/csu/2009edicniplan.nsf/publ/2003-09-v_roce_2008

The Report on Water Management in the Czech Republic in 2008
http://mze.cz

[1] The population equivalent indicates the size of a pollution source; pollution from industrial and other plants is converted to the number of inhabitants that would produce the same amount of pollution.

12/ Common bird species indicator

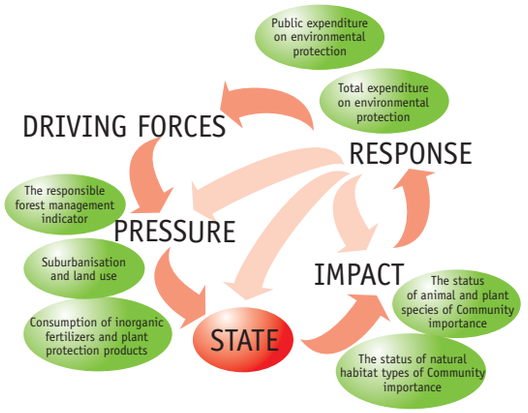
KEY QUESTION ➜

What progress has been made in stopping the decrease in the number of common bird species, farmland bird species and forest bird species?

KEY MESSAGES ➜

The abundance of the populations of common bird species and of farmland birds continues to decline. It is thus apparent that the condition of both biodiversity and the landscape has been deteriorating in the Czech Republic.

The abundance of the populations of forest bird species has stagnated.



OVERALL ASSESSMENT ➜

Change since 1990	☹
Change since 2000	☹
Last year-to-year change	N/A

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

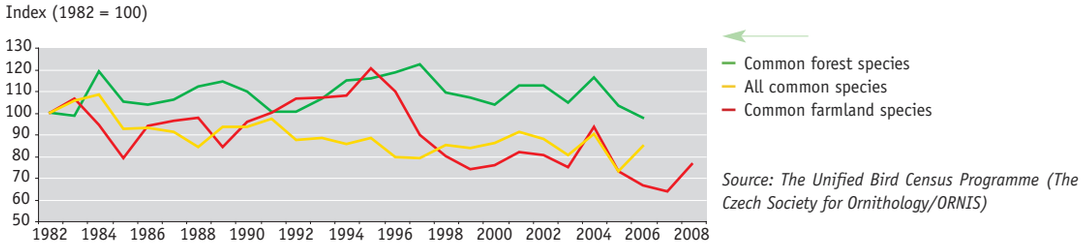
The Birds Directive (Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds) is of key significance.

The 1992 **Convention on Biological Diversity** addresses, among other things, the issue of biodiversity loss. Its main objectives are the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. In 2006, the Commission adopted the Biodiversity Action Plan – in response to the need to halt the decline of biodiversity by 2010. The plan's specific measures apply to both the European Community and all member states.

Other documents:
The National Biodiversity Strategy of the Czech Republic, The State Nature Conservation and Landscape Protection Programme

INDICATOR ASSESSMENT

Chart 1 ➜ **The common farmland bird species indicator, the common forest bird species indicator and the overall indicator of all common bird species in the Czech Republic [index, 1982 = 100], 1982–2008**



Source: The Unified Bird Census Programme (The Czech Society for Ornithology/ORNIS)

The main indicators of both **the condition of and the development of biodiversity** include the abundance and the distribution of selected species. Population trends within selected taxonomic groups are the main indicators that are defined by the Convention on Biological Diversity. Changes in the abundance of different species that make up the diversity of a monitored area may help to timely identify possible negative factors threatening biodiversity, i.e. before they cause the disappearance of some species and, by extension, before biodiversity loss occurs. However, relevant data are not available for all constituents of biodiversity, meaning

that indicators must be constructed based on data for well-studied groups. The best-studied taxa, for which relevant indicators of the development of their abundance and distribution within the Czech Republic can be constructed, include birds.

The common farmland bird species indicator and the common forest bird species indicator are a subset of the overall indicator of the abundance of all common bird species.
Over the monitored period, the total value of the abundance of all common bird species indicator declined. Also, the division of the indicator into groups according to the main types of environment shows the differences between these groups.

The abundance of common **farmland** bird species declined mostly in the first half of the 1980s. The populations stabilised at the end of the 1980s and increased in the early 1990s. Between 1994 and 1995, the index grew to the 1982 level. After that, however, another decline occurred. According to a published scientific study [Reif, J. et al., 2008], the main cause of the decline of field birds was the intensification of agriculture. The reduction of agricultural land also affects the declining abundance of populations. More considerate farming could help reverse the current trend of declining farmland species.
The populations have not yet been affected by the rise in organic farming. Even though the area of considerately farmed land has increased more than fifteen-fold since 1997 (still, this is only about 8% of all agricultural land), no increase in the populations of farmland bird species has been observed.

The common **forest bird species** indicator has stagnated with a few larger fluctuations in the mid 1980s and the early 1990s, and also between 2005 and 2006. The slight increase in the populations of forest birds (between 1993 and 1997) was probably caused by random events.
According to the Czech Society for Ornithology, the abundance of common farmland bird species in Europe decreased by about a half over the past 25 years. Some species that used to be common – such as the Eurasian tree sparrow (*passer montanus*), the northern lapwing (*vanellus vanellus*) and the skylark (*alauda arvensis*) – are now on the list of rapidly declining species. The situation in the new EU member states, where the situation with respect to field birds has been better, is now also deteriorating. Both financial and human resources for monitoring are currently limited.
Individual monitoring programmes and indicators themselves need to be mutually coordinated and their results need to be put to maximum use. Taking into account the knowledge and information value, the indicators will probably need to be supplemented in the future. In recent years, the common bird species and common forest bird species indicators have not been required by state institutions.

DATA SOURCES

➜ The Unified Bird Census Programme (The Czech Society for Ornithology/ORNIS of the Comenius Museum)
(The provision of the indicator of farmland bird species is financed by the Technical Assistance measure of the Rural Development Programme of the Czech Republic for 2007–2013 in cooperation with the Ministry of Agriculture and the Czech Society for Ornithology.)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1600)

The Czech Society for Ornithology
http://www.birdlife.cz

The Unified Bird Census Programme
http://jpsp.birds.cz

BirdLife International
http://www.birdlife.org/index.html

European Bird Census Council, Pan-European Common Bird Monitoring Scheme
http://www.ebcc.info/pecbm.html

VERMOUZEK Z. 2008: Indikátor ptáků zemědělské krajiny za rok 2008 (The farmland bird species indicator 2008). A study for the Ministry of Agriculture of the Czech Republic. The Czech Society for Ornithology, Prague, Přerov 2008. Unpubl., 21pp.

REIF J., VOŘÍŠEK P., ŠŤASTNÝ K., BEJČEK V. & PETR J., 2008: Agricultural intensification and farmland birds: new insights from a central European country. Ibis, 2008. doi: 10.1111/j.1474-919x.2008.00829.x.

13/ Status of animal and plant species of Community importance

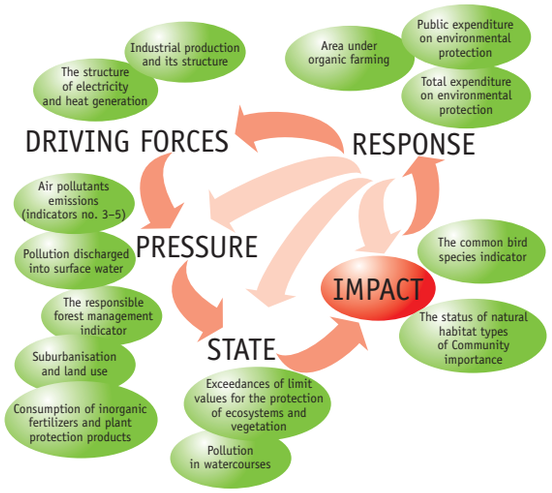
KEY QUESTION ➜

What is the status of animal and plant species of Community importance in the Czech Republic?

KEY MESSAGES ➜

The conservation status of 37% of animal and plant species of Community importance is assessed as unfavourable-inadequate and 35% (or 36%) as unfavourable-bad.

The selection of some species that are endangered at the European level points to the general condition of the Czech Republic's natural environment in relation to biodiversity – understood as species richness. The general condition appears to be rather unfavourable.



OVERALL ASSESSMENT ➜

An assessment of the status of animal and plant species of Community importance was made for the 2000–2006 period; the data for the 2007–2012 period will be available in 2013. For this reason, it is not possible to assess longer-term trends. This will only be possible (for all species that are important to the European Community) after 2013.

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The EU Strategy for Sustainable Development (2001) set the objective of halting the loss of biodiversity and restoring natural habitats and natural systems by 2010.

The main political framework is the **Communication from the Commission: Halting the Loss of Biodiversity** by 2010 – and Beyond including the **Biodiversity Action Plan** from 2006. Adopted in 2002, the Sixth Environment Action Programme of the European Community, "Our Future, Our Choice" defines the conservation of biological diversity as one of the four main areas to be addressed.

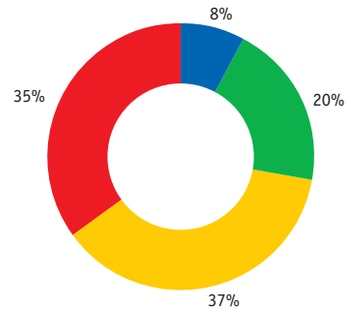
The 1992 **Convention on Biological Diversity** also addresses the issue of biodiversity loss. Its main objectives are the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. In 2006, the Commission adopted the Biodiversity Action Plan – in response to the need to halt the decline of biodiversity by 2010. The plan's specific measures apply to both the European Community and all member states. In 2008, the European Commission presented a mid-term assessment and, in 2010, the Commission will publish a comprehensive analysis, i.e. whether the EU has or has not halted the decline.

The indicator is also in accordance with the indicator that is defined at the Convention on Biological Diversity level – "The abundance and distribution of selected species" and that exists at the EU level by the SEBI 2010 project entitled "Species of Community Importance".

Other documents: **The National Biodiversity Strategy of the Czech Republic (2005)**

INDICATOR ASSESSMENT

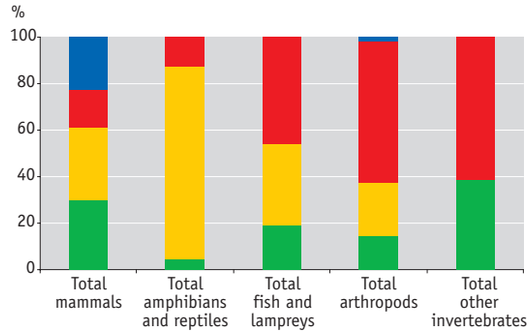
Chart 1 ➜ **The status of animal species of Community importance in the Czech Republic [%], 2000–2006**



Favourable status
Unfavourable-inadequate status
Unfavourable-bad status
Unknown status

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

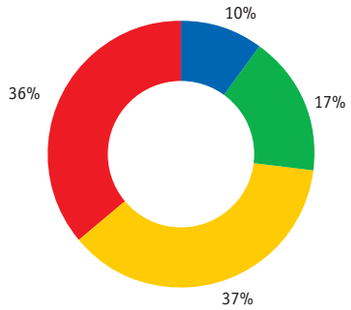
Chart 2 ➜ **The status of animal species of Community importance in the Czech Republic [%] according to taxonomic groups, 2000–2006**



Favourable status
Unfavourable-inadequate status
Unfavourable-bad status
Unknown status

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

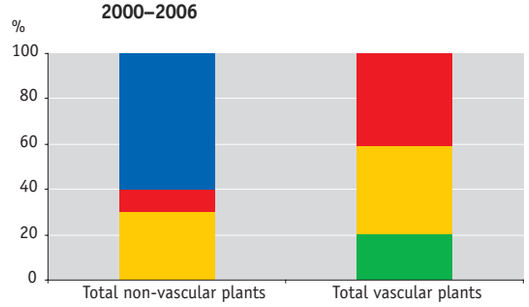
Chart 3 ➜ **The status of plant species of Community importance in the Czech Republic [%], 2000–2006**



Favourable status
Unfavourable-inadequate status
Unfavourable-bad status
Unknown status

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

Chart 4 ➜ **The status of plant species of Community importance in the Czech Republic [%] according to groups, 2000–2006**



Favourable status
Unfavourable-inadequate status
Unfavourable-bad status
Unknown status

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

Determining the overall status of each species consists of four sub-parameters: area, population, habitat and the likely development. If one of these parameters is assessed as unfavourable, the overall status of the species is also assessed as unfavourable.

The indicator reflects **the state of biodiversity in the Czech Republic**, with an ever increasing number of species being assessed as endangered – according to the criteria of the International Union for Conservation of Nature (IUCN). It mainly shows the relative proportions of the total assessment of species (defined by Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna) within the above scale.

The status of about one-third of the **animal species** of Community importance is assessed as unfavourable-bad and one-third as unfavourable-inadequate and their habitats are probably more or less disrupted. It is quite difficult to document any direct link to the type of habitat: the most endangered species include species of natural watercourses (which have been adversely affected by regulation and changes in watercourse dynamics), species that are tied to old and decaying wood (which is much less abundant in Czech woods), and groups of species that are tied to a fine landscape mosaic of types of both landscape elements and care for them (butterflies, amphibians and reptiles). In the Czech Republic, only 20% of animal species of Community importance have a favourable conservation status.

Similarly to animal species, the status of about one-third of the **plant species** of Community importance is assessed as unfavourable-bad and one-third as unfavourable-inadequate and their habitats are also likely to be more or less disrupted. Only 17% of plant species of Community importance have a favourable conservation status.

Indicator assessment according to taxonomic groups
Analogically to the overall indicator, sub-indicators of animal species of Community importance have been defined for the taxonomic groups of monitored animals – mammals, amphibians and reptiles, fish and lampreys, arthropods and other invertebrates. Birds are not species of Community importance in terms of the Habitats Directive (92/43/EEC, see indicator 12).

Within these groups, invertebrate groups have a considerably worse assessment – the unfavourable-bad status covers more than one-half of both arthropods and other invertebrate groups (species that are important to the European Community include molluscs and the European medical leech (*hirudo medicinalis*)). Arthropods (insects, crustaceans, and one pseudoscorpion species) include a wide range of species that are tied to the above-mentioned types of endangered biotopes, ranging from structurally (age and species) rich forests and solitary trees, to heterogeneously managed non-forest habitats and largely unaltered aquatic habitats. This is mainly due to the different approach for selecting species classified as species of importance to the European Community. Among the much more numerous invertebrates, severely endangered species were primarily selected. By contrast, for vertebrates – whose species are less numerous – species have often been selected that are only endangered in some parts of Europe. The situation is also striking in the case of mammals, which have the highest proportion of favourable assessments – due to the inclusion of a greater number of species that are mainly endangered in Western (i.e. considerably more urbanized and fragmented) Europe.

Analogically to the overall indicator, sub-indicators of plant species of Community importance have been defined for groups of monitored plants – vascular and non-vascular. In the case of non-vascular plants (species of Community importance include lichens and bryophytes), the fact that the group has only been studied to a limited extent has the greatest effect (a high proportion of the "unknown" category), especially when compared to vascular plants that have a long tradition of research.
By contrast, vascular plants show a one-third proportion of species with an unfavourable-bad status, in spite of the long-term care for and conservation of specially protected plant species and their habitats.

From the international perspective, the status of animal and plant species that are important to the European Community can be compared on several levels. At the interstate level, at the level of bio-geographical areas, and possibly at the European-wide level. The status of species of Community importance in the Czech Republic reflects the European-wide trend and shows average results at this level.

The **strategic and political objective of the EC** and the member states is to maintain a favourable status (as defined by the Habitats Directive Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna) of the components of the natural environment or, as the case may be, to prevent worsening their status and ideally to improve it.
Six-year intervals have been set for assessment monitoring – these intervals will allow for assessing possible trends and their direction.

DATA SOURCES

- The Agency for Nature Conservation and Landscape Protection of the Czech Republic
- The assessment report on the conservation status of species of Community importance and natural habitat types in the Czech Republic pursuant to Article 17 of the Habitats Directive for the European Commission, July 2008

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1602)

Monitoring pursuant to the Habitats Directive 92/43/EEC and the Birds Directive 79/409/EEC
http://www.biomonitoring.cz

SEBI 2010 – Detailed indicators of nature conservation at the EU level – the description of methodology
http://reports.eea.europa.eu/technical_report_2007_11/en

14/ Status of natural habitat types of Community importance

KEY QUESTION

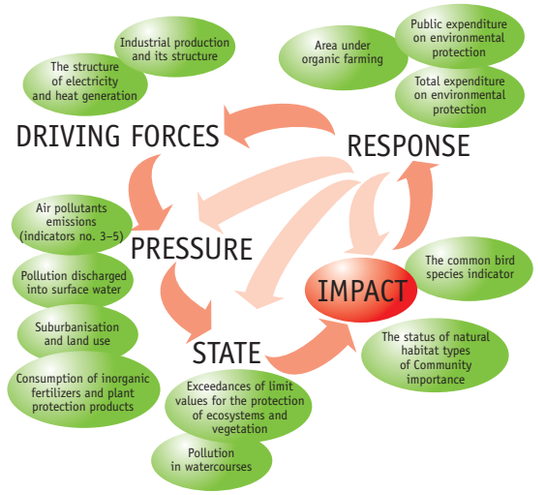
What is the status of natural habitat types of Community importance in the Czech Republic?

KEY MESSAGES

The status of almost three-quarters of natural habitats in the Czech Republic is assessed as unfavourable, 14% as less favourable and only 12% of natural habitats are assessed as having a favourable conservation status.

The assessment is unfavourable for forests, grassland communities and small-scale habitats such as halophyte habitats.

The condition of natural habitats in the Czech Republic is unsatisfactory. Despite the fact that this is a selection of natural habitat types at the European level, the result can be viewed as an indication of the overall condition of natural biotopes in the Czech Republic.



OVERALL ASSESSMENT

An assessment of the status of natural habitats was only made for the 2000–2006 period; the data for the 2007–2012 period will be available in 2013. For this reason, it is not possible to assess the trend. This will only be possible (for all species of Community importance) after 2013.

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

The EU Strategy for Sustainable Development (2001) set the objective of halting the loss of biodiversity and restoring natural habitats and natural systems by 2010.

The main political framework is the Communication from the Commission: **Halting the Loss of Biodiversity** by 2010 – and beyond including the Biodiversity Action Plan from 2006. Adopted in 2002, **The Sixth Environment Action Programme of the European Community**, "Our Future, Our Choice" defines the conservation of biological diversity as one of the four main areas to be addressed.

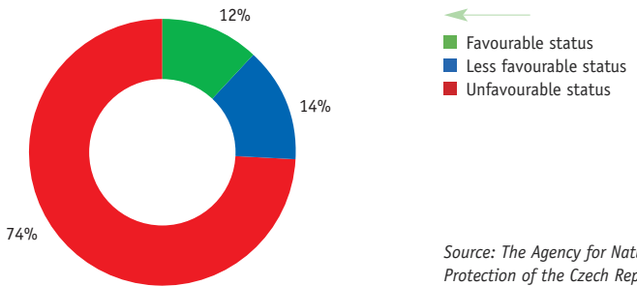
The 1992 **Convention on Biological Diversity** also addresses the issue of biodiversity loss. Its main objectives are the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. In 2006, the Commission adopted the Biodiversity Action Plan – in response to the need to halt the decline of biodiversity by 2010. The plan's specific measures apply to both the European Community and all member states. In 2008, the European Commission presented a mid-term assessment and, in 2010, the Commission will publish a comprehensive analysis, i.e. whether the EU has or has not halted the decline.

The indicator is also in accordance with the indicator that is defined at the Convention on Biological Diversity level – "Trends of the extent of selected biomes, ecosystems and habitats" and that exists at the EU level by the SEBI 2010 project entitled "Natural Habitats of Community Importance".

Other documents: **The National Biodiversity Strategy of the Czech Republic**

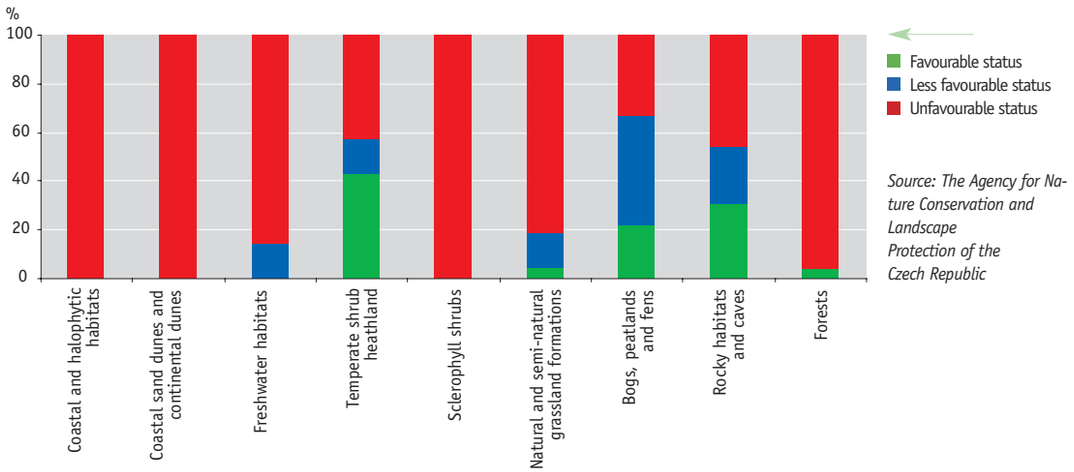
INDICATOR ASSESSMENT

Chart 1 ➜ **The status of natural habitats in the Czech Republic [%], 2000–2006**



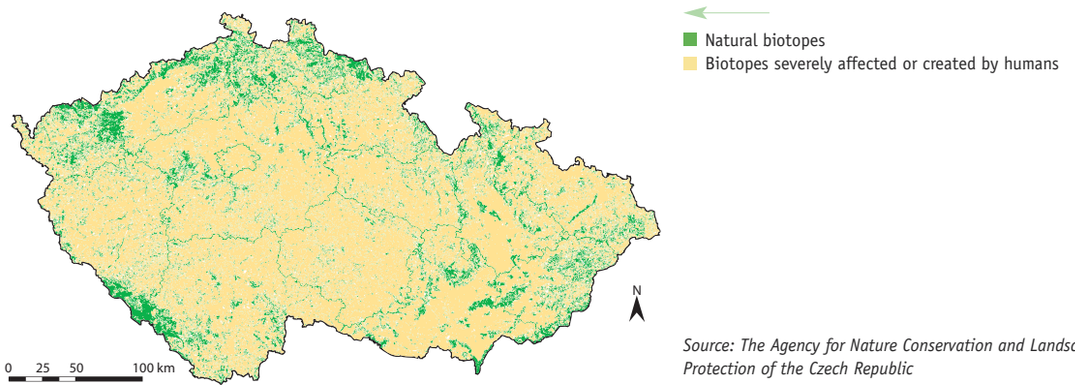
Source: The Agency for Nature Conservation and Landscape Protection of the Czech Republic

Chart 2 ➜ **The status of natural habitats in the Czech Republic according to individual formation groups [%], 2000–2006**



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

Figure 1 ➜ **The distribution of natural biotopes and anthropogenically affected biotopes in the Czech Republic, 2000–2005**



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

The map shows the distribution of all **natural biotopes** (both those that are and those that are not included in the Natura 2000 network) in the Czech Republic, that were found during the first mapping of biotopes between 2000 and 2005.

The indicator of **natural habitat types of Community importance** can be viewed as an indication of the result and the overall condition of natural habitats in the Czech Republic – despite the fact that the indicator only addresses natural **habitat** types of Community importance.

Determining the overall status of each natural habitat type is composed of **four sub-parameters** – current size, potential area, structure and function, and prospects for the future. If one of these parameters is assessed as unfavourable, the overall status of the habitat is also assessed as unfavourable.

Area, size and prospects for the future were mostly assessed as favourable and less favourable. However, the quality of structure and function is much worse since these mainly concern the biological value of the habitat and thus also its ability to resist external pressure.

A total of 95 natural habitat types were assessed – 11 have a favourable status, 13 have a less favourable status and 71 an unfavourable status. In the Czech Republic, the assessment is unfavourable for habitats that are not very large and for forests. On the contrary, the assessment was relatively the most favourable for heaths, rocky habitats, peatlands and fens.

From the international perspective, the status of natural habitats of Community importance can be compared on several levels – at the level of interstate comparisons, at the level of bio-geographical areas, and possibly at the European-wide level. The results that were presented above correspond to the status at the European-wide level. Therefore, the status of natural habitats is not significantly different from the European-wide level.

The strategic and political objective of the EC and the member states is to maintain the favourable status (as defined by the text of the Habitats Directive) of the components of the natural environment or, as the case may be, to prevent the worsening of their status and ideally to improve it. Six-year intervals have been set for assessment monitoring – these intervals will allow for assessing possible trends and their direction.

DATA SOURCES

- ➜ The Agency for Nature Conservation and Landscape Protection of the Czech Republic
- ➜ The assessment report on the conservation status of species of Community importance and natural habitat types in the Czech Republic

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1604)

Monitoring pursuant to the Habitats Directive 92/43/EEC and the Birds Directive 79/409/EEC
http://www.biomonitoring.cz

SEBI 2010 – detailed indicators of nature conservation at the EU level – the description of methodology
http://reports.eea.europa.eu/technical_report_2007_11/en

15/ Responsible forest management indicator

KEY QUESTION ➜

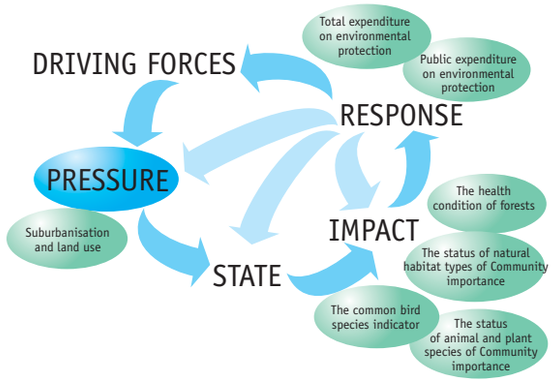
Has the development of forest management been positive from the environmental perspective?

KEY MESSAGES ➜

In recent years, the proportion of deciduous trees in the total area of the Czech Republic's forests has been – very slowly but steadily – increasing.
The proportion of firs in afforestation has been rising over the long term.

The proportion of firs in the total area of the Czech Republic's forests has stagnated.
The proportion of deciduous trees in afforestation has been stable at about 35%.

Since 2005, we have seen a slow increase in the area of clearings. The trend has resulted from extreme weather events, not from forest management practices.
Peaking in 2004, the size of natural reforestation areas has been declining in recent years. The trend has resulted from extreme weather events, not from forest management practices.



OVERALL ASSESSMENT ➜

Change since 1990	
Change since 2000	
Last year-to-year change	

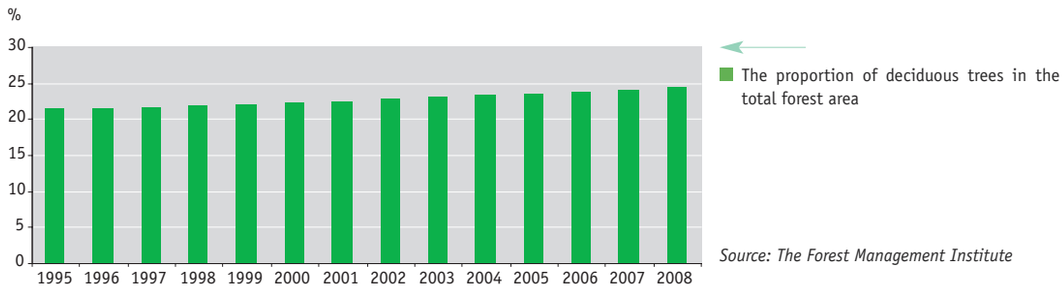
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The State Environmental Policy of the Czech Republic for 2004–2010, the objectives for forestry: promoting the continual increase in the proportion of amelioration and compacting tree species in forest renewal and afforestation, reducing damage to wetlands by logging, and reducing the drying out of these areas; conserving and utilizing the forest genetic fund; promoting the renewal of forest ecosystems in highly polluted areas; promoting the certification process within the framework of the PEFC system (Programme for the Endorsement of Forest Certification Schemes) and using sound technologies in forest management; achieving and subsequently maintaining a balance between the condition of forest ecosystems and game populations.

Other documents:
The National Forestry Programme for the period until 2013
The National Biodiversity Strategy of the Czech Republic defines 8 objectives for forest ecosystems, of which the following need to be mentioned: adopting measures to increase the proportion of the natural renewal of forest stands that are suitable both genetically and with respect to species, which is closely related with reducing the numbers of cloven-hoofed game; finalizing the methodology for monitoring and for describing the state of the biodiversity of forest ecosystems; further developing the network of forest specially protected areas that are left to develop spontaneously.

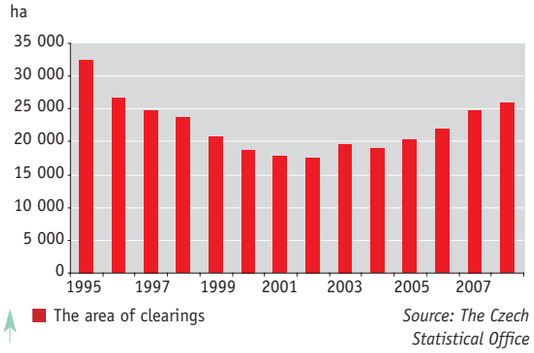
INDICATOR ASSESSMENT

Chart 1 ➜ **The proportion of deciduous trees in the Czech Republic's total forest area [%], 1990–2008**



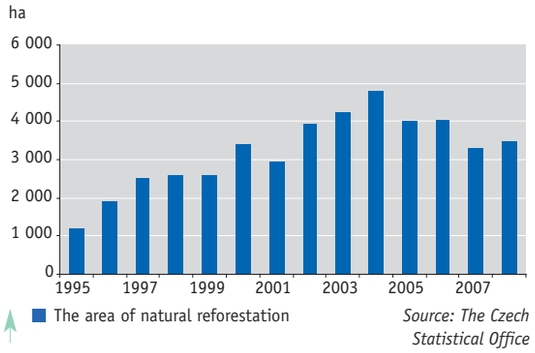
Source: The Forest Management Institute

Chart 2 ➜ **The area of clearings in the Czech Republic [ha], 1995–2008**



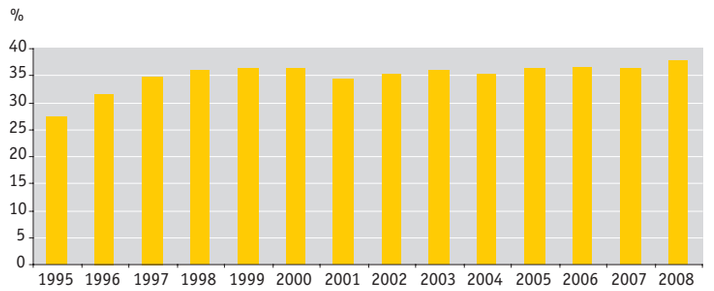
Source: The Czech Statistical Office

Chart 3 ➜ **The area of naturally renewing areas in the Czech Republic [ha], 1995–2008**



Source: The Czech Statistical Office

Chart 4 ➜ **The proportion of deciduous trees in afforestation in the Czech Republic [%], 1995–2008**



Source: The Czech Statistical Office

The following six indicators have been selected for assessing sound forest management. The proportion of deciduous trees in the Czech Republic's total forest area has been growing very slowly (Chart 1). This is mainly due to a long rotation period. Since 1995, the proportion of firs in the total forest area has been stable at 0.9%.
The gradual increase in clearings in recent years has resulted from the formation of clearings due to extreme weather events, not from forest management practices (Chart 2).
Over the monitoring period, natural forest renewal increased approximately threefold, which is a major positive phenomenon in terms of both forestry and the environment. Over the past four years, the proportion of natural renewal decreased in connection with an increase in the renewal of areas resulting from salvage felling (Chart 3).
The proportion of deciduous trees in afforestation has fluctuated around 35% over the long-term (Chart 4). In recent years, deciduous trees (e.g. beach, oak, maple, rowan) have been increasingly used in forest renewal – at the expense of conifers (spruce, pine). The proportion of firs in afforestation increased from 2% in 1995 to 6.4% in 2008. This leads to a favourable change in the species composition towards a more natural (and stable) structure of forest stands. The future fate of young forest stands that are richer in species remains a bit problematic because of browsing in locations with excessive populations of cloven-hoofed game and due to inadequate educational interventions.
It can be concluded that within the objectives of the State Environmental Policy of the Czech Republic, forest management has been developing in a moderately positive direction.
If the objectives of the State Environmental Policy and the National Forestry Programme for the period until 2013 are met, the age and species composition of forests will improve and both the vitality and resilience of forests will increase, making the forests better able to withstand adverse influences. In addition, the species richness and the diversity of forests will increase.

DATA SOURCES

- ➜ The Czech Statistical Office
- ➜ The Forest Management Institute

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1596)

The Forest Management Institute
http://www.uhul.cz

16/ Health condition of forests

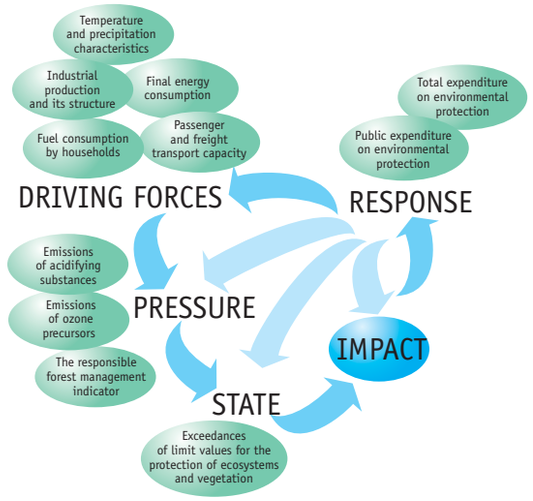
KEY QUESTION ➜

What development has there been in the health condition of forest stands?

KEY MESSAGES ➜

Damage to forest stands expressed as the rate of defoliation (the loss of foliage) has not progressed as fast as it used to. Over the past two years, the pace of the increase in defoliation rate has slowed down due to reduced air pollution.
Despite a slowdown in the pace of increase, the defoliation rate remains very high in the Czech Republic, mainly due to poor air quality and the inappropriate species and age composition of forests (the largest proportion of Czech forests is made up of non-native spruce monocultures that are sensitive to climatic conditions and vulnerable to pests and that degrade forest soil with their litterfall). Furthermore, the overpopulation of cloven-hoofed game is also a risk factor.

In recent years, the health condition of Czech forests has been affected by the consequences of climate change, in particular by the more frequent occurrence of droughts, heat waves and European windstorms.



OVERALL ASSESSMENT ➜

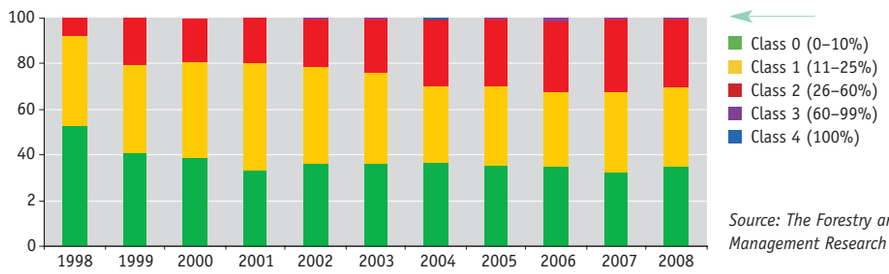
Change since 1990	N/A
Change since 2000	😕
Last year-to-year change	😕

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The National Forestry Programme for the period until 2013
The ICP Forests – Forest Focus programme
The National Biodiversity Strategy of the Czech Republic

INDICATOR ASSESSMENT

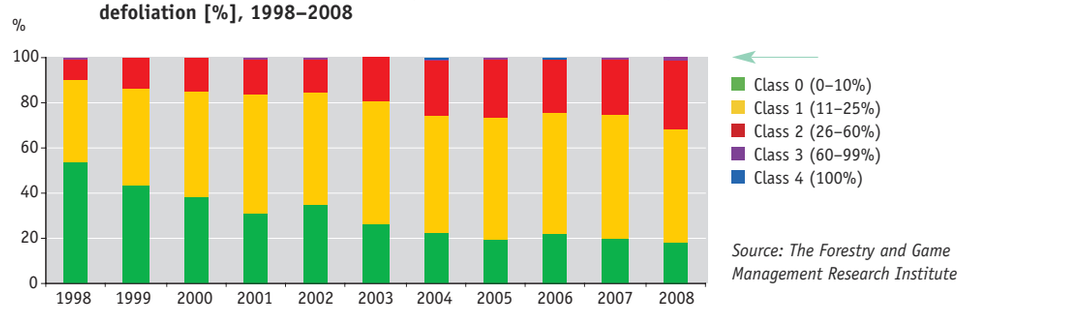
Chart 1 ➜ **The defoliation of conifers (stands up to 59 years of age) in the Czech Republic according to classes of defoliation [%], 1998–2008**



Source: The Forestry and Game Management Research Institute

Defoliation levels are divided into five basic classes, of which the last three characterize significantly damaged trees: 0 – no defoliation (0–10%); 1 – slight defoliation (11–25%); 2 – moderate defoliation (26–60%); 3 – severe defoliation (61–99%); 4 – dead trees (100%)

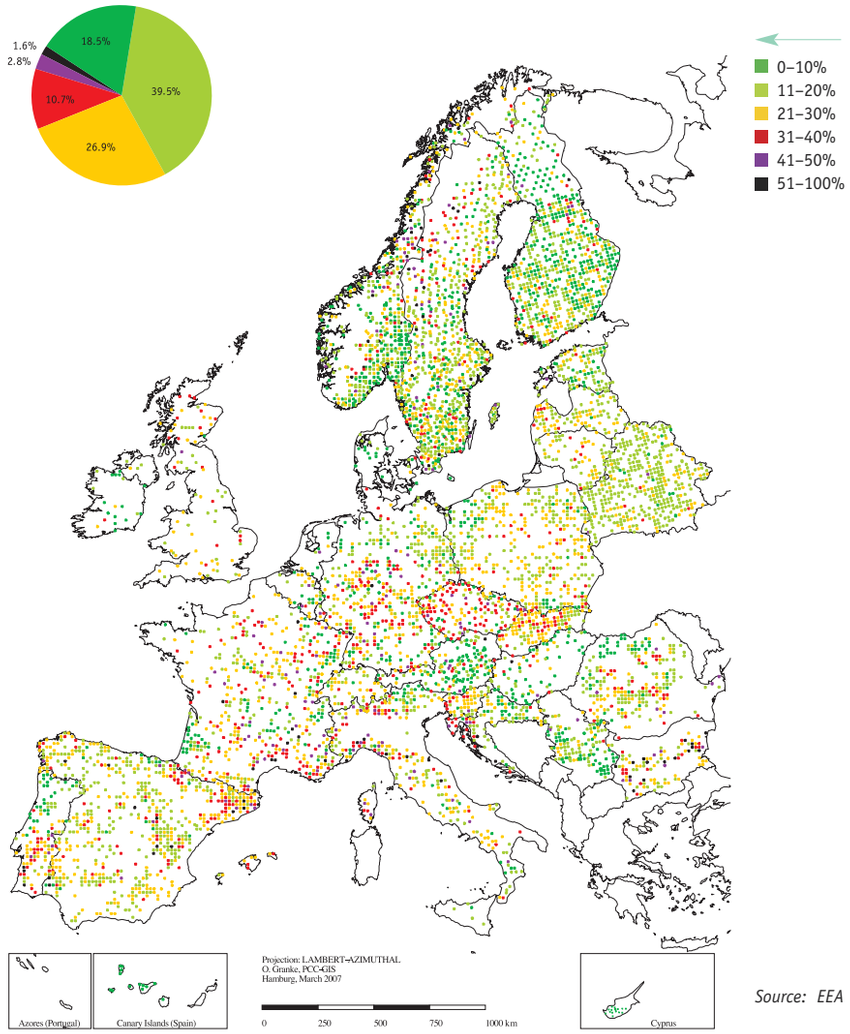
Chart 2 ➜ **The defoliation of deciduous trees (stands up to 59 years of age) in the Czech Republic according to classes of defoliation [%], 1998–2008**



Source: The Forestry and Game Management Research Institute

Defoliation levels are divided into five basic classes, of which the last three characterize significantly damaged trees: 0 – no defoliation (0–10%); 1 – slight defoliation (11–25%); 2 – moderate defoliation (26–60%); 3 – severe defoliation (61–99%); 4 – dead trees (100%)

Figure 1 ➜ **The defoliation rate in Europe, 2006**



Source: EEA

In recent years, **the increase in defoliation has slowed down** in the Czech Republic, which can be viewed as a response of forest stands to air quality improvement over the past two decades.

In **coniferous forests up to 59 years of age**, the proportion of defoliation class 2 (26–60%) stands in has been growing over the long-term, at the expense of classes 0 and 1, which may have been caused by the effects of adverse biotic factors and pests on stands that had been weakened by air pollution.
Compared to the preceding year, the total defoliation of conifer stands up to 59 years of age showed no significant change in 2008. Only a slight decrease in the proportion of defoliation class 2 stands and a mild increase in defoliation class 0 was recorded. Over the long-term trend, younger conifers (up to 59 years of age) have a lower defoliation level than younger deciduous stands.

In 2008, there was a slight deterioration in the trend in defoliation in **coniferous stands up to 59 years of age**, with a noticeable increase in the proportion of defoliation class 2 stands and, to a lesser extent, class 3 – at the expense of classes 0 and 1. Younger beech (Fagus sylvatica) stands showed a slight reduction in defoliation rate; the proportion of class 0 increased while the proportion of classes 1 and 2 decreased. By contrast, young birch (Betula pendula) stands showed a slight deterioration in defoliation, the proportion of defoliation classes 1 and 3 increased while the proportion of classes 0 and 2 decreased.

Over the past decade, **an improvement in the overall dynamics** of the health status of forest stands has occurred in response to positive changes in air quality. Due to the inertia of the chemical processes in soil, this response occurs naturally with a certain time lag, i.e. a time lag that is required by forest stands to respond to environmental changes. However, in some regions, there are still concentrations of pollutants (e.g. nitrogen oxides from exhaust gases) that may pose a significant threat to the overall stability of forest ecosystems whose ability to withstand additional burden has been exhausted in some areas. The impact of ground-level ozone is being increasingly listed as a risk factor (especially in foreign studies).

In the **international context**, the condition of Czech forests remains bad and is the worst in Central Europe – despite the significant reduction in emissions in the 1990s. This is true despite the fact that in recent years, the pace of the increase in defoliation has slowed down owing to the general improvement of air quality. Within the EU27, the Czech Republic is among the countries with the highest degree of defoliation. From the international perspective, the EU27 countries with the highest degree of defoliation were the Czech Republic (56.2%), Bulgaria (37.4%), France (35.6%) and Italy (30.5%) in 2006. Estonia, Denmark, Ireland, Finland and Romania showed defoliation rates under 10%.

Between 1995 and 1999, the **defoliation rate in the EU27** decreased from 26% to 21.2%. After 2000, there was yet another increase and – despite a decline in 2006 – the average annual rate of increase in defoliation was more than 1% between 2000 and 2006.

If the objectives of the State Environmental Policy and the National Forestry Programme for the Period until 2013 are accomplished, both the vitality and the resilience of forests will improve, making the forests better able to withstand adverse influences.

DATA SOURCES

- The Forestry and Game Management Research Institute
- The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1542)

A Guide to Forestry
http://www.vulhm.cz/index.html?did=77&lang=cz

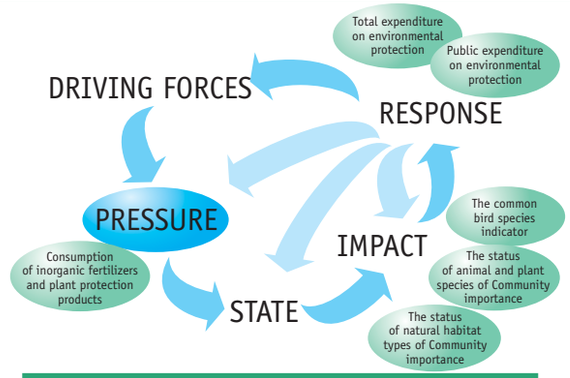
Forestry Research Reports
http://www.vulhm.cz/index.html?did=81&lang=cz

Reports on the Condition of Forests and Forest Management in the Czech Republic, the Ministry of Agriculture of the Czech Republic
http://www.uhul.cz/zelenazprava

17/ Suburbanisation and land use

KEY QUESTION

Has land use in the Czech Republic been optimised?



KEY MESSAGES

There is an increase in the proportion of developed areas and other areas that are considerably destabilising elements in the landscape. Developed areas mostly exist on agricultural land, which increases landscape fragmentation.

The increase in forest lands, permanent grasslands and water surfaces is positive.

OVERALL ASSESSMENT

Change since 1990	N/A
Change since 2000	
Last year-to-year change	

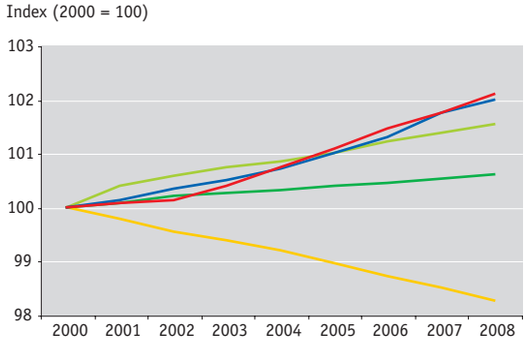
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

The Czech Republic's obligations stem from the European **Landscape Convention**. The main aim of the Convention is to provide for the protection of individual types of European landscape. Its importance lies in the fact that it entails the obligation to prepare and implement meaningful and sustainable landscape policies (from the perspective of the type of landscape) with the involvement of the public and local and regional authorities, the obligation to take landscape characteristics into consideration when forming territorial development policies, urban planning and other departmental and interdepartmental policies.

Other documents:
The Biodiversity Protection Strategy of the Czech Republic

INDICATOR ASSESSMENT

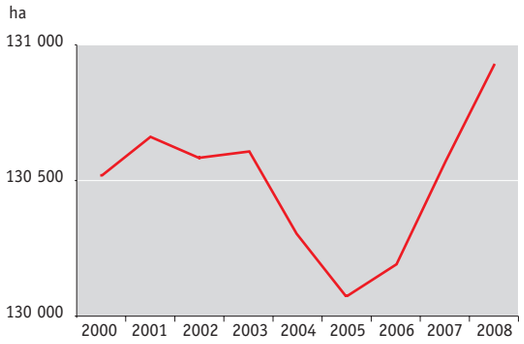
Chart 1 **The development of the land use in the Czech Republic [index 2000 = 100], 2000–2008**



- Arable land, hops fields, vineyards
- Permanent grasslands, fruit orchards, gardens
- Forest lands
- Water surfaces
- Developed and other areas

Source: The Czech Office for Surveying, Mapping and Cadastr

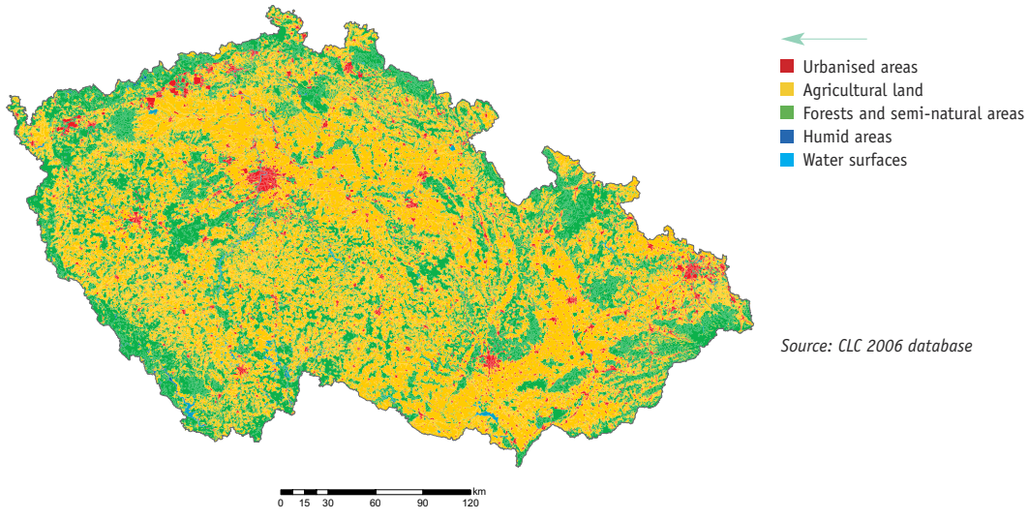
Chart 2 **The development of developed areas and yards in the Czech Republic [ha], 2000–2008**



- Developed areas and yards

Source: The Czech Office for Surveying, Mapping and Cadastr

Figure 1 → **The Czech Republic's landcover, 2006**



Source: CLC 2006 database

Two different groups of changes are typical for the **present landscape dynamics**. On one hand, outlying areas that are uninteresting from the agricultural, recreational or industrial perspective are experiencing a decrease in the intensity of anthropogenic activity and an efflux of economically active inhabitants. On the other hand, many areas are experiencing dynamic societal actuation in terms of urbanisation, intensive agricultural production and forestry, transport network construction or recreation.

The composition of the Czech Republic's land use is typical of countries with a high proportion of arable land and forests (each category covering approximately one third of the country). Other significant land use categories are permanent grass stands and developed and other areas. The least favourable for maintaining ecological stability and landscape functions are developed and other areas (artificial land surface, small retention capacity, etc.) and in some cases, arable land (intensive utilisation of agrochemicals associated with landscape intervention), whose proportion in the landscape (and dynamics) is an indicator of anthropogenic effects on the landscape.

The increase in the proportion of urbanised areas (since 1990, by 5% compared to the original area), which is unfavourable for ecological stability, has caused negative changes in the discharge conditions of rainwater, leading to a decrease in the amount of habitable areas and affecting local temperatures. Presently, the main landscape threat is the gradual limiting of its passability, especially through fragmentation by line structures, fencing and continuous construction. The construction of highways and speedways, adjustments to railway lines, the construction of new roads, new development around roads and streams have caused even more undesirable landscape fragmentation, leading to the extinction of many species' biotopes. Landscape fragmentation, i.e. the process of gradual segmentation of continuous areas of the natural environment into smaller mutually isolated locations that gradually lose their functions, are currently one of the most significant factors that threatens the further existence of many species.

According to data from The Czech Office for Surveying, Mapping and Cadastre, agricultural land decreased by 18 500 ha between 2003 and 2007, while according to the Czech Statistical Office, it decreased by 113 457 ha during the same time period. The difference is caused by different methodologies used for collecting and registering data. Czech Office for Surveying, Mapping and Cadastre's data is available only after construction is complete, so there is an amount of delay compared to the actual situation. The Czech Statistical Office gets its data from Agrocenzus, a nation-wide agricultural tracing system. However, Agrocenzus only includes land larger than 1 ha. On the other hand, the cadastre administered by The Czech Office for Surveying, Mapping and Cadastre includes all agricultural parcels.

Between 1980 and 2005, the proportion of non-fragmented landscape decreased from 81% to 64% of the total area within the Czech Republic. Forecasts indicate intensification of this phenomenon to a critical level; the 2004 prognoses assume that the proportion of non-fragmented landscape will be 53% in 2040.

Forests and the landscape

One of the key processes in the development of a large town's upcountry is **suburbanisation**, the expansion of the residential and commercial functions of towns into the surrounding landscape (especially large-scale retail and storage facilities). Suburbanisation can take place in a "green field" or can absorb already-existing villages in the town's vicinity. These villages completely change their characteristics as a consequence of this process and are transformed (or sections of them are transformed) into suburbia (town housing zones outside the town). In the Czech Republic, suburbanisation is typical of the current development around Prague; it is also taking place less intensively around Brno and other large towns.

The suburbanisation process is responsible for excessive utilisation of the landscape and changes to the landscape's character, affects biodiversity as a biotic component of the landscape and affects the relief, soil, water and air as abiotic components of the landscape. There are sports facilities, such as large golf courses, large shopping and advertisement centres and residential neighbourhoods being built in the landscape. The landscape is divided into many smaller parts that could be compared to numerous unconnected and isolated islands. This affects the vitality and size of populations of plants and animals.

New development introduces changes to the original relief (new dumps, embankments, etc.) and causes modifications to hydrographical conditions (enclosing streams in pipes, area drainage). At the same time, soil degradation occurs, e.g. due to worsened rainwater infiltration that reduces the refilling of underground water.

Between 2000 and 2005, **the growth rate of urbanised area** considerably increased compared to 1990–2000. This documents the quick increase in the proportion of industrial areas, developed areas, construction sites and mining areas to the detriment of arable land (almost 11 hectares of arable land disappear every day). Approximately 69 km^2 (almost 0.2% of overall arable land) of the arable land disappeared, which is approximately the same amount identified in the previous mapping period in 2000. However, this same amount of land was repurposed in a shorter amount of time (6 years). The greatest increase within urbanised areas was attributed to construction sites (according to the 2006 Corine Land Cover (CLC) database, 30.2 km^2 of land was modified compared to 5.6 km^2 of land in CLC2000).

An international comparison is somewhat complicated because of the different categories of area utilisation. Compared to European countries (EEA methodology), the situation in the Czech Republic is better in terms of forested areas. Forests in the Czech Republic occupy 33.6% of its area, while throughout Europe it is 28%. Bodies of water in the Czech Republic occupy 2.1% of its area, while the rest of Europe is 3%. Arable land accounts for 38.4% of the Czech Republic, and in Europe this equals 33%.

If agricultural land is not sufficiently protected and agricultural use of this land is not maximally supported, the proportion of developed and other areas will increase to the detriment of agricultural land.
Greater attention should be paid to the creation of territorial and zoning plans. Towns and villages should not change these plans under the pressure of investors and developers.

DATA SOURCES

→ The Czech Office for Surveying, Mapping and Cadastre
→ Database CORINE LC 2006

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1598)

CORINE Land Cover 2006
http://www.cenia.cz

The Czech Office for Surveying, Mapping and Cadastre
http://www.cuzk.cz

18/ Industrial production and its structure

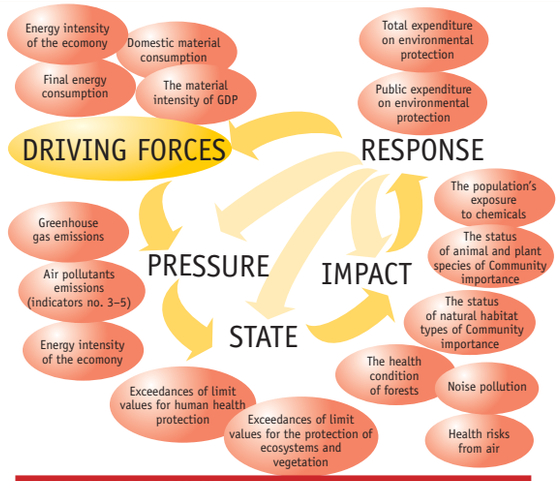
KEY QUESTION ➜

What is the impact of the development of industrial production and its structural changes on the environment?

KEY MESSAGES ➜

In the 2000–2008 period, industrial production in the Czech Republic was not associated with any increased negative environmental impacts. Between 2000 and 2008, structural changes became apparent through the "lightening" of the production structure, i.e. an increase in the proportion of those branches producing technologically more complex products with higher added value and lower energy and emission intensity (automotive, electronics, computer technology). Virtually all branches also went through technologically innovative development. Therefore, the objectives, especially of the State Enviromental Policy, have been successfully fulfilled.

Despite positive development due to the extraordinary position that industry has in the overall Czech economy, a relatively high energy and material intensity in industry still prevails. This hinders attempts to reduce industry's environmental impacts. In some branches, stagnation or even partial situational worsening is occurring.



OVERALL ASSESSMENT ➜

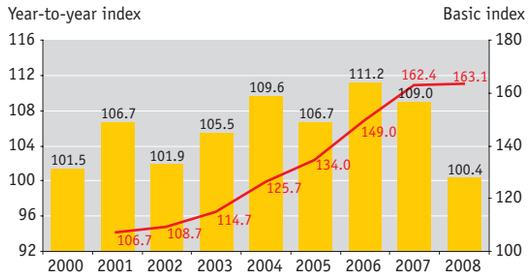
Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The **State Environmental Policy of the Czech Republic** has the following industrial objectives: to more thoroughly include environmental aspects in industrial policies; to develop structural intentions of industrial production towards products with higher finality and a greater increase in the value of inputs, more favourable environmental effects; to support the voluntary introduction of best available techniques (BAT); to support programmes focused on the development of ecologically-minded mechanical engineering and to support ecological investments in air protection, the treatment and purification of waste water, the processing and disposal of waste and the introduction of "cleaner" technologies; to reduce pollutants emitted into the air and water, not to pollute streams with industrial water and waste chemicals and to improve waste water treatment.

INDICATOR ASSESSMENT

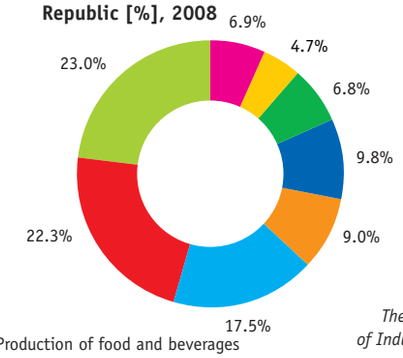
Chart 1 ➜ **An index of industrial production in the Czech Republic, 2000–2008**



Year-to-year index of industrial production (the same period in the previous year = 100)
Basic index of industrial production (2000 = 100)

Source: The Czech Statistical Office, The Ministry of Industry and Trade

Chart 2 ➜ **Industrial production structure in the Czech Republic [%], 2008**

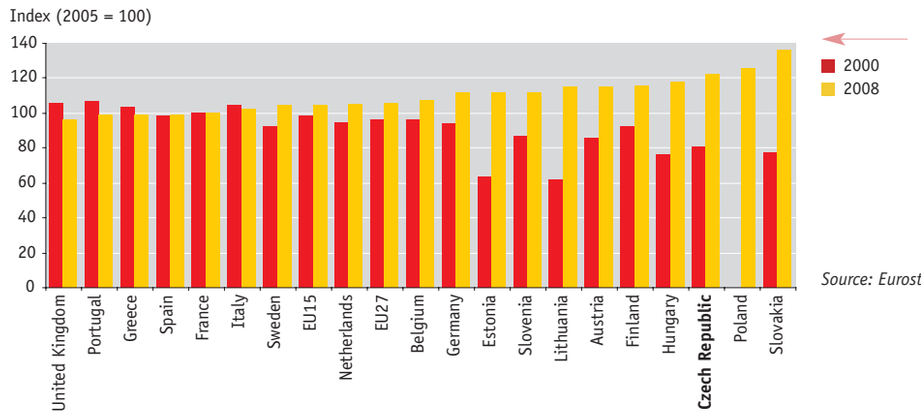


Production of food and beverages
Production of chemicals, preparations and drugs
Production of rubber and plastic products
Production of basic metals, metallurgical metalworking products
Production of and repairs to machinery and equipment
Production of electrical and optical equipment and products
Production of vehicles
Other

Source: The Ministry of Industry and Trade

Industrial production structure according to income from sales of products and services.

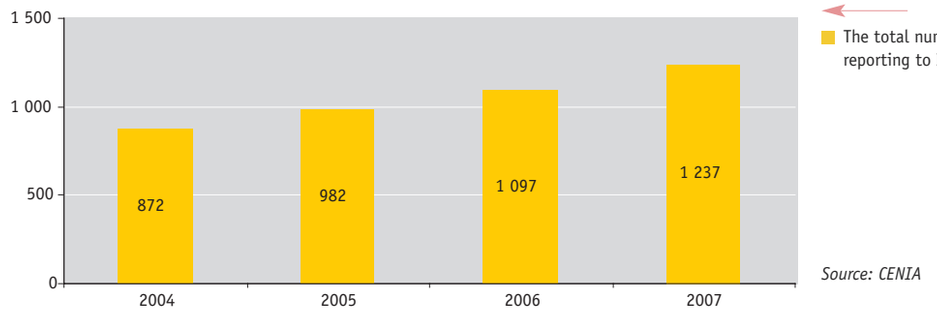
Chart 3 ➜ **Industrial production index, an international comparison, 2000 and 2008**



Source: Eurostat

Total industrial production index (i.e. mining, processing and the energy sector, excluding water distribution). The index is recalculated according to the number of days worked.

Chart 4 ➜ **The number of plants reporting to Integrated Pollution Register (IPR) in the Czech Republic, 2004–2007 (as of 21 August 2009)**



Source: CENIA

Industry, or more accurately, the processing industry, is a key driver of economic activity and economic growth in the Czech Republic. However, at the same time, it is one of the main sources of environmental burden. The characteristics of the relationship between industry and the environment is best described by a comparison of the development of industrial production (according to its index) and the development of industrial energy intensity, pollution emissions and greenhouse gases, waste and costs of production greening.

The position of industry in the Czech economy is still extraordinary. The share of Czech industry in **GDP** fluctuates around 32%, while the average share in the EU27 was approximately 20% over a comparable time period. In the EU15 countries, the proportion was even lower – 19.5%, especially due to the gradual dematerialisation of the economy. Figures above 25% are only seen in six EU countries.

Despite slight fluctuations, the development of **industrial production** has been increasing over the long-term since 2000 (compared to the beginning of the 1990's when there was inhibition of material and energy intensive production) (Chart 1). As an international comparison, industrial production in the Czech Republic has been growing in stronger, almost double the rate compared to the EU25 average, or rather the EU27 (Chart 3). Only 2008 showed stagnation and the beginning of a decline in relation to the global economic crisis.

While metallurgy and the fledgling automotive industry dominated the industry structure in 2000, the main driver in 2008 was the automotive industry (approximately 22% of the overall industrial production) (Chart 2). In addition, the share of plastics

production (with a strong relationship to the automotive industry) and the production of electrical and optical equipment and appliances significantly increased. Other linked branches developed in parallel with these areas.
The development of the chemical and food industries was also positive in 2008.

In terms of **industry's environmental impact**, there is an apparent correlation between structural changes in industry, changes of production technologies and the environment. Within the processing industry, these structural changes were mainly manifested through the "lightening" of the production structure between 2000 and 2008, i.e. there was growth in the share of branches producing more technologically complex products with higher added value and lower energy and emission intensity (the automotive, electronic and computer industries). Virtually all branches went through technological innovation development, especially the production of vehicles, electrical and optical equipment. This also included restructured metallurgical production.

However, despite the positive development, there is still **higher energy and material intensity** in industry, which impedes the reduction of environmental impacts. Stagnation or even partial worsening of the situation in some branches has occurred.

Considerable shares of the metallurgical, chemical, refinery-petrochemical and the processing industries affect energy intensity indicators which, due to technological innovations and the development of other processing industry branches, have been gradually decreasing. Compared to the 1990's, **energy intensity** in the processing industry has decreased by approximately 20%.

An important tool for increasing the awareness of releases and transfers of pollutants in industrial and agricultural emissions released into the environment is the Integrated Pollution Register (IPR). This register stems from Regulation of European Parliament and Council 2006/166/EC, Act No 25/2008 Coll. and Government Regulation No 145/2008 Coll. The total number of facilities that reported the required data in the IPR between 2004–2007 is listed in Chart 4.

The processing industry **invested** the most in environmental protection. In 2000, investments in environmental protection in the processing industry totalled CZK 3.9 billion; in 2007, this figure reached CZK 7.6 billion and in 2008 approximately CZK 4.8 billion. In 2007, the processing industry was a dominant investor in the environment, accounting for approximately 38% of all investments in environmental protection (i.e. more than public services). In 2008, it accounted for almost 24% of all environmental protection investments. The majority of the funds were invested in waste water disposal, air and climate protection and waste disposal.

DATA SOURCES

- The Ministry of Industry and Trade
- The Czech Statistical Office
- The Czech Hydrometeorological Institute
- Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1568)

An overview of Czech industry
http://www.businessinfo.cz/files/2005/071122_mpo_panorama_zprac_prum_2006_okec_15_22.pdf

19/ Final energy consumption

KEY QUESTION

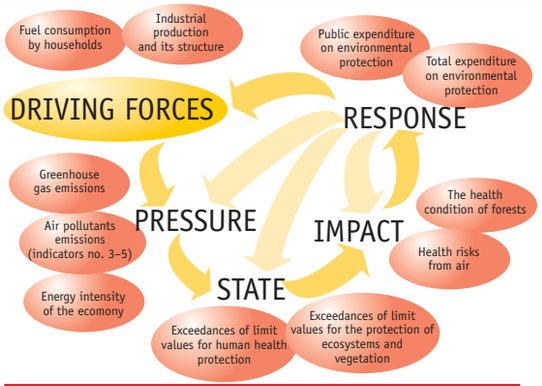
Are energy consumption and subsequent potential environmental burden decreasing in the Czech Republic?

KEY MESSAGES

On a year-to-year basis (2000–2006), final energy consumption in the Czech Republic increased by 1–3%. The largest energy consumption increase can be seen in transportation.

In the last two years (2007–2008), there was a change in the trend and a reduction in overall energy consumption.

By international comparison, the Czech Republic has the lowest energy consumption per capita for all advanced countries.



OVERALL ASSESSMENT

Change since 1990	
Change since 2000	
Last year-to-year change	

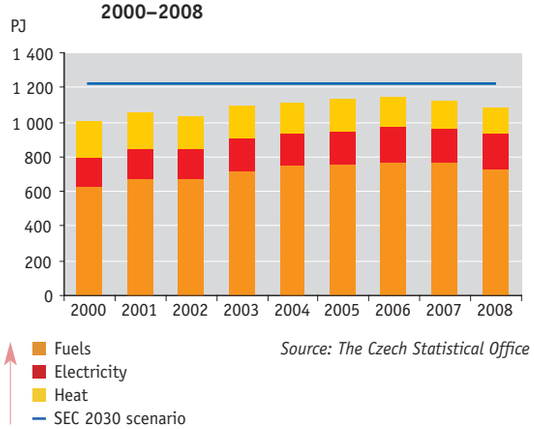
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

The aim of the **State Enviromental Policy of the Czech Republic** is to promulgate energy consumption and supply within sustainable development.

The aims of the **State Energy Concept** (SEC) are to maximise heat savings in the buildings of the commercial, state and multi-family sectors, as well as with minor users (individual households); to maximise the efficiency of appliances and distribution power systems and to reduce losses in distribution lines.

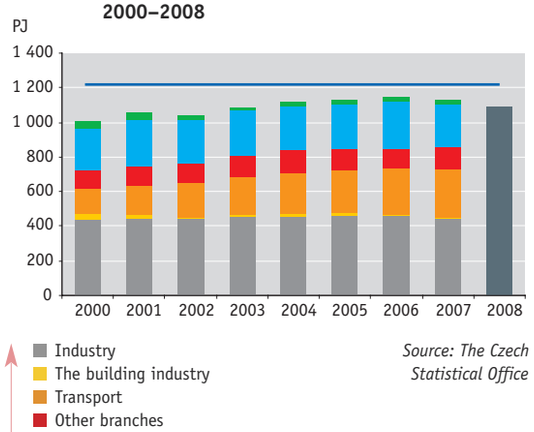
INDICATOR ASSESSMENT

Chart 1 → **The development of final energy consumption in the Czech Republic according to resources [PJ], 2000–2008**



Source: The Czech Statistical Office

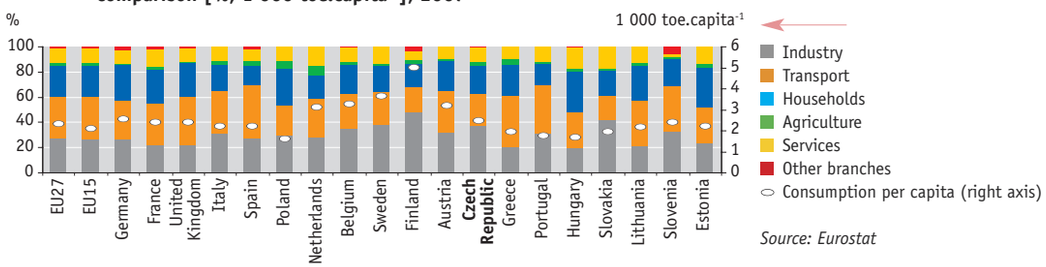
Chart 2 → **The development of final energy consumption according to branches in the Czech Republic [PJ], 2000–2008**



Source: The Czech Statistical Office

Data for the sectoral classification of final energy consumption for 2008 are not available with regard to the methodology of their processing.

Chart 3 ➜ **Final energy consumption classified according to sectors and energy consumption per capita, and international comparison [%, 1 000 toe.capita^{-1}], 2007**



Source: Eurostat

The tonne of oil equivalent (toe) is a unit of energy: the amount of energy released by burning one tonne of crude oil, approximately 42 GJ.

Over the past few years, **final energy consumption** has been increasing and between 2000 and 2006, it grew by 14%. In 2007, the situation reversed and consumption decreased (by 1.7%). In 2008, the decline was even more intensive (to 3.5%).
Within individual forms of energy, **electricity consumption** is increasing the most, by 0.1 to 3.4% on a year-to-year basis. In addition, **fuel** consumption is increasing every year (by 1–6%), which is mainly caused by the effect of strong consumption increases in transportation. On the other hand, there has been a strong decline in **heat** consumption throughout entire period monitored (with the exception of 2001); between 2000 and 2007, its consumption decreased by 20%.
In **sectoral classifications**, the greatest proportion of energy (39%) is consumed in **industry**. However, final energy consumption fluctuates in this area on a year-to-year basis. Nevertheless, in recent years (since 2006), there has been a slight decrease in all types of energy: electricity, heat and fuels (a year-to-year decline by 3% from 2006–2007). Within the processing industry, the most energy intensive branches are the chemical and petrochemical industries, the production of metals and metallurgical processing and the production of non-metallic mineral products.
The second greatest use of total energy consumption over the monitored period (2005–2007) was **households**, where consumption fluctuated on a year-to-year basis from +11.4% (2001) to –9.7% (2007). In 2007, energy consumption in households was the lowest for the entire period monitored and its share in total energy consumption was 22%.
Since 2007, the amount of energy consumed in households was exceeded by the **transportation sector** (25% of all consumption in 2007), whose consumption quickly increased throughout the monitored period. From 2000–2007, this sector saw an increase in energy consumption by 86%. Between 2000 and 2008, traction energy consumption in engine transportation increased by 50% according to the Transport Research Centre. Preliminarily, engine and electric transportation consumed 268,646 TJ of energy in 2008, i.e. 24.7% of the total energy consumption of the Czech Republic.
Electricity and heat **consumption** recalculated **to one inhabitant** has stagnated or slightly decreased on a year-to-year basis; between 2000 and 2008 it decreased by 5.1%.
By **international comparison**, the Czech Republic has above-average consumption of energy recalculated to one inhabitant compared to the EU15 and EU27 countries (2.5.10^3 toe.capita^{-1} compared to 2.3.10^3 and 2.1.10^3 toe.capita^{-1}). Regarding energy consumption distribution in national economy sectors, the Czech Republic has a higher rate of energy consumption in industry compared to the EU27 and EU15 countries. On the other hand, despite a strong increase in traffic over the past few years, energy consumption in this sector is still below the European average.
With the application of the measures of the **State Energy Concept**, the energy economy will head towards a higher valuation of energy inputs, increased savings and a better energy management. It is expected that electricity consumption will increase, but with a gradual slowing down of the consumption growth rate. The average year-to-year growth rate of electricity consumption in 2030/2000 will be 1.3%. The proportion of renewable power sources used to generate electricity for domestic consumption will increase to 15.7% by 2030.

DATA SOURCES

- The Czech Statistical Office
- Eurostat, The Statistical Office of the European Union
- The Transport Research Centre

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1557)

The State Environmental Policy of the Czech Republic
http://www.mzp.cz/cz/statni_politika_zivotniho_prostredi

The State Energy Concept of the Czech Republic
http://www.mpo.cz/dokument5903.html

20/ Fuel consumption by households

KEY QUESTION ➜

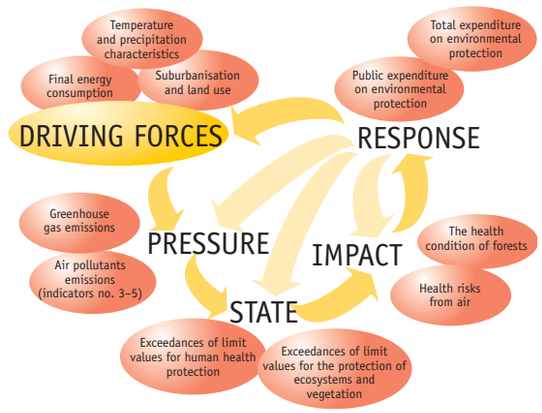
What progress has been made in reducing local heating units that have a negative impact on air quality and public health?

KEY MESSAGES ➜

😐 Local heating units significantly contribute to air pollution. PM_{10} emissions from local heating units account for 34.6% of all air pollution by this pollutant.

😐 The predominant heating methods in the Czech Republic are natural gas heating and district heating. The number of households that use these heating methods is gradually increasing. In addition, the amount of heat obtained from solar collectors and heat pumps is slightly increasing each year.

😐 The number of households that use solid fuels is declining. In 2008, coal sales to households dropped by 11.3%.



OVERALL ASSESSMENT ➜

Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

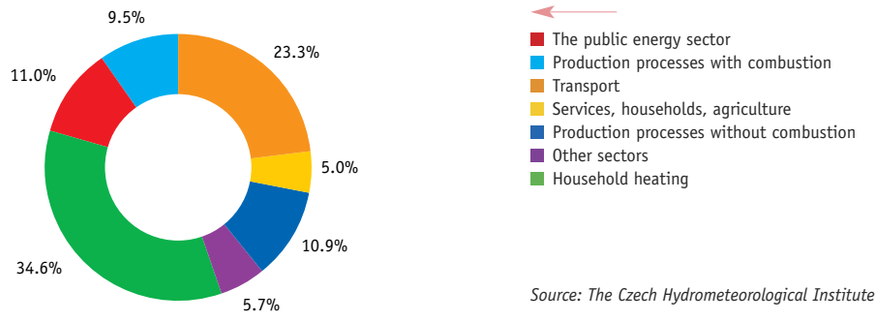
The **State Environmental Policy of the Czech Republic** aims to reduce coal-fired local heating units that severely pollute the ground layer of the atmosphere. In addition, undisciplined burning of municipal waste produces emissions of toxic pollutants.

The **State Energy Policy of the Czech Republic** aims to promote heat savings in buildings and to support heat generation from renewable energy sources.

The ecological tax reform encourages citizens to use cleaner fuels for heating. Since January 2008, an excise tax (about 10% for coal, about 1% for electricity for heating has been imposed on fuels that produce greater amounts of harmful emissions. Conversely, cleaner fuels are exempt from any tax (biomass and other renewable sources, natural gas for household heating). Furthermore, wood briquettes and pellets are now subject to a reduced VAT rate, which means an additional price advantage.

INDICATOR ASSESSMENT

Chart 1 ➜ **PM_{10} emissions from individual economic sectors in the Czech Republic [%], 2007**



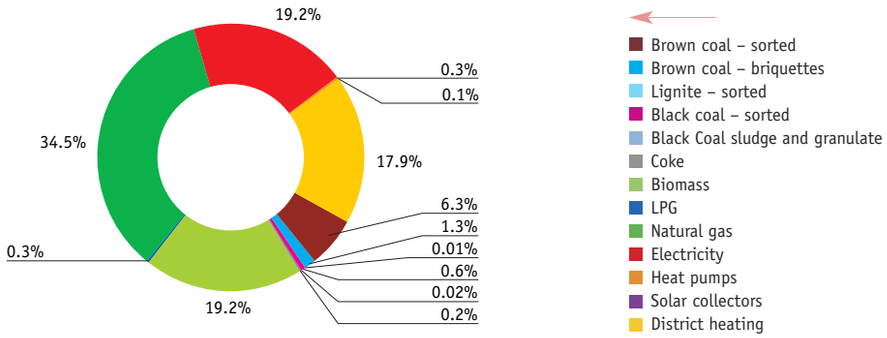
Source: The Czech Hydrometeorological Institute

Due to emission reporting procedures, data for 2008 are not yet available.

Chart 2 ➜ **Household heating methods in the Czech Republic, 1991–2008**

Source: The Czech Hydrometeorological Institute

Chart 3 ➜ **Fuel and energy consumption by household (the proportion of energy contained in individual sources) in the Czech Republic [%], 2008**



Source:
The Ministry of Industry and Trade

The chart indicates total energy consumption by household; in addition to household heating, it also includes sources for hot water heating, cooking, electricity for the operation of household appliances, etc.

The mix of household heating is closely linked to the air quality of the immediate environment in which we live. Local heating units significantly contribute to air pollution, especially if poor quality fuels (or even garbage) are used for heating. However, combustion technology also plays a major role. When a modern automatic brown-coal boiler is used, the amount of emissions may be lower than is the case for biomass combustion in an average boiler.

In 2007, total **PM_{10} emissions** from local heating units were 11.98 kt, which corresponds to 34.6% of the total emissions of this pollutant in the Czech Republic (Chart 1). In 2006, emissions equalled 12.4 kt.

In the Czech Republic, limit values for particulates that are valid in all EU countries are regularly exceeded – not only locally, but also in larger areas. In 2008, 24-hour limit values for PM_{10} were exceeded in 3% of the Czech Republic, i.e. areas that house 15% of the population. The limit value for annual PM_{10} concentrations was exceeded in 0.5% of the Czech Republic, i.e. in areas that house 3% of the population (the areas where the 24-hour and the annual limit values were exceeded overlap).

Since 1991, the **number of households** using solid fuels – especially coal – for heating has significantly declined; to a large extent, these fuels have been replaced by natural gas (Chart 2). Currently, natural gas and district heating are the most widely used household heat sources in the Czech Republic. Chart 2 shows "main heating"; also, it needs to be stressed that the division of solid fuels into coal and wood is difficult to specify since these two fuels are, to a large extent, burned together and, from the user's perspective, their actual mutual proportion largely depends on their price. Households usually use multiple types of fuels for heating – the most common combinations include gas/wood and coal/wood. Rural areas use gas or electricity/coal/wood.

Industry and energy sector

In 2008, the total **amount of energy** that was delivered to **households** from individual sources (100% in Chart 3) equalled 275 155 TJ.
In terms of the **energy balance** (Chart 3), coal sales showed a year-to-year decline (11.3%) in 2008, which was probably caused by an increase in coal prices and certain negatives associated with this heating method. Sales of pellet and wood-gas boilers, solar collectors and heat pumps are growing. Sales of automatic coal boilers have increased, while sales of steel and cast-iron (conventional) boilers for solid fuels have stagnated. The above balance indicates that a shift in household heating towards renewable energy sources or, at least, better-quality coal combustion can be expected in the future.

Each year, the amount of heat generated using **solar collectors** and **heat pumps** is increasing (there was a 30% year-to-year increase in both systems). However, solar collectors are more often used for producing hot water and for preheating water for heating. However, the use of both systems is currently very limited. The proportion of the total amount of heat for households in the Czech Republic that is generated by solar collectors and heat pumps is on the order of tenths of a percent.

An amendment to Act No 86/2002 Coll., on air protection is currently **under preparation** – in addition to transposing the requirements of Directive 2008/50/EC, the amended act is aimed at improving the effectiveness of existing instruments in order to significantly contribute to improving air quality in all regions of the Czech Republic. As an important step within the amended act, the application of emission ceilings will be expanded (to include more than the current extra large combustion sources of air pollution), **possibilities for toughening emission limits** and technical requirements for emission sources due to increased air pollution levels will be strengthened, and an **individual approach to sources will be introduced** – again, with regard to local air pollution levels.

The implementation of the **Green Savings subsidy programme** should result in reduced energy requirements for heating buildings, thus reducing the amount of emissions produced by local sources for household heating.

DATA SOURCES

➜ The Czech Hydrometeorological Institute
➜ The Czech Statistical Office
➜ The Ministry of Industry and Trade

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1566)

The State Environmental Policy of the Czech Republic
http://www.mzp.cz/cz/statni_politika_zivotniho_prostredi

The State Energy Policy of the Czech Republic
http://www.mpo.cz/dokument5903.html

Act No 86/2002 Coll., on air protection

Act No 261/2007 Coll., on the stabilization of public budgets (the Ecological Tax Reform)

21/ Energy intensity of the ecomony

KEY QUESTION ➜

Are the efforts in reducing energy intensity of the Czech economy successful?

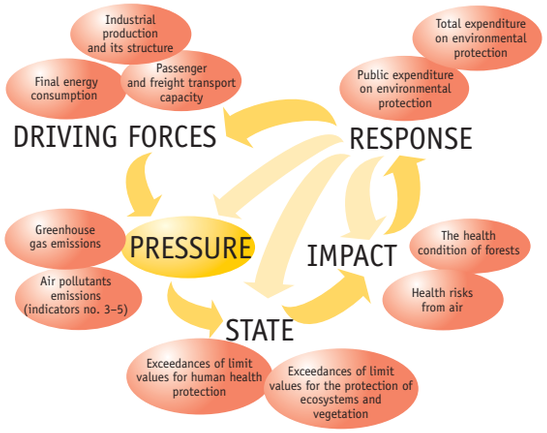
KEY MESSAGES ➜

The energy intensity of the Czech economy has been decreasing since 2004. Over the past few years, the year-to-year decrease of energy intensity in GDP generation was more than 5%; in 2008 it decreased by 6.4%.

However, by international comparison, the Czech economy has higher energy intensity than most countries.

There has been a considerable reduction in solid fuel consumption in the primary energy sources (PES) structure.

High energy intensity mainly exists in transportation, industry and agriculture.



OVERALL ASSESSMENT ➜

Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

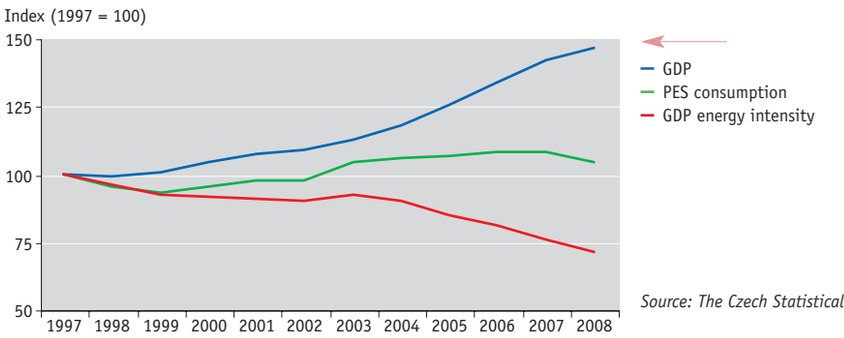
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The aim of the **State Enviromental Policy of the Czech Republic** is to reduce energy intensity (energy consumption per GDP unit) in order to fulfil the objectives of the State Energy Concept. Another goal is to reduce the energy intensity of the national economy by developing regional energy concepts, performing energy audits and engaging in activities directed at reducing energy losses during energy transfer.

The long-term objectives of the **State Energy Concept of the Czech Republic** include accelerating then stabilising the decrease in the proportion of energy intensity in GDP at an annual rate of 3.0–3.5% (indicative objective); accelerating then stabilising the decrease in the proportion of energy intensity in GDP at an annual rate of 1.4–2.4% (indicative objective).

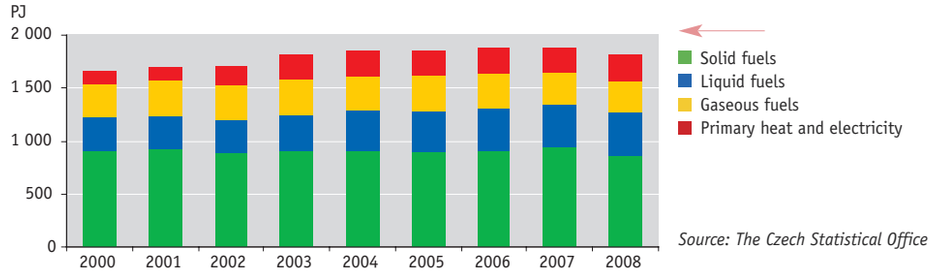
INDICATOR ASSESSMENT

Chart 1 ➜ **The Czech Republic's energy intensity in GDP, 1997–2008**



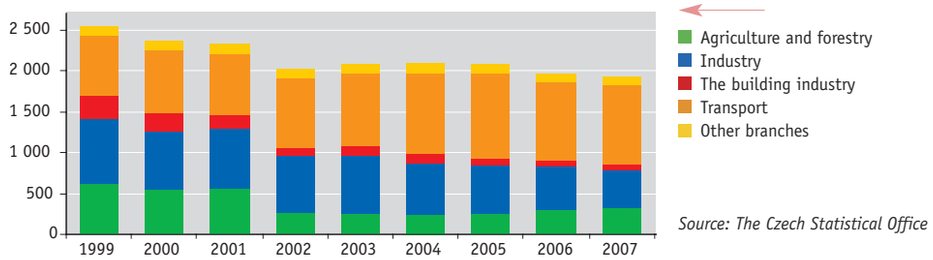
Source: The Czech Statistical Office

Chart 2 ➜ **The development of primary energy resources consumption [PJ] in the Czech Republic, 2000–2008**



Source: The Czech Statistical Office

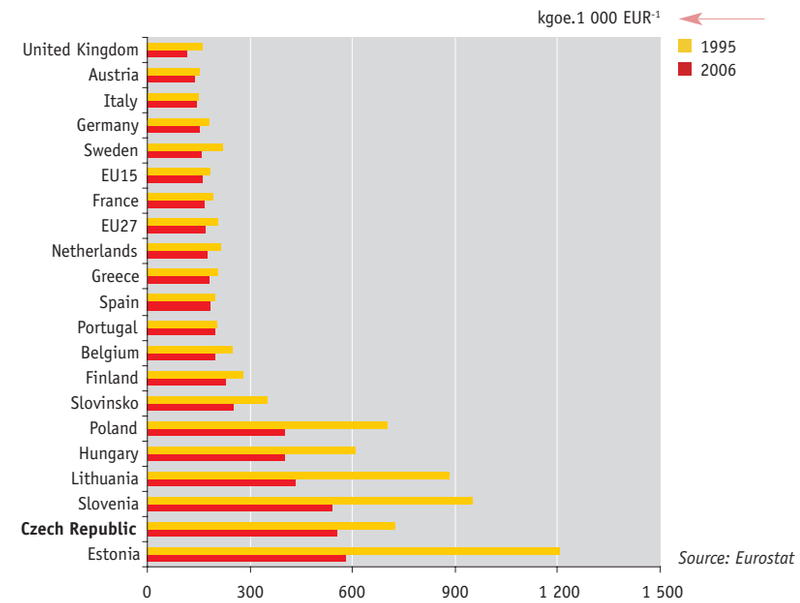
Chart 3 ➜ **The development of energy intensity per sector expressed as the division of total energy consumption in the sector and gross added value in the sector in the Czech Republic [MJ.thousands of CZK^{-1}], 1999–2007**



Source: The Czech Statistical Office

Due to reporting procedures, data for 2008 are not available.

Chart 4 ➜ **Energy intensity of the economy, an international comparison [kgoe.1 000 EUR^{-1}], 1995, 2006**



Source: Eurostat

The year-to-year rate of **energy intensity decline** was very unstable and greatly fluctuated between 2000 and 2003. However, since 2004, the situation improved considerably and energy intensity has been quickly decreasing (Chart 1). In addition to economic growth, this fact is also evidenced by the implementation of the State Energy Concept, which was adopted in March 2004. Domestic energy consumption per GDP unit has been continuously decreasing since 2004.

Over the past four years, the **year-to-year decline** in energy intensity of Czech GDP was more than 5%; according to preliminary data for 2008, it decreased by 6.4%, which was the largest decline during the monitored period (1997–2008).

Increasing energy efficiency is concededly the most significant way to reduce energy demand, reduce pollutant emissions into the environment, reduce the growth of import energy dependence and increase the competitive strength of both the energy sector and the economy as a whole.

The consumption of primary energy sources (PES) in the Czech Republic has been continuously growing on a year-to-year basis since 2000, by 0.5–6.6%. This trend stopped in 2007 and PES consumption slightly declined (by 0.1%). In 2008, the decline was stronger, by 3.3%.

There has been a considerable consumption reduction in the **PES structure**, especially in terms of solid fuels: their amount decreased on a year-to-year basis by 9.2% between 2007 and 2008; the share in total PES consumption declined in 2008 to 47%. Other fuel consumption did not see any significant changes.
With regard to the amount of GDP generated, the Czech Republic has been consuming more primary energy and electricity sources than objectively required (the value of consumed energy is little increased by the added value). Despite these achievements, energy and electricity intensity in the Czech GDP is still high compared to the EU average. High energy intensity is seen in the transportation, industry and building industry sectors. Although energy intensity has been decreasing on a year-to-year basis in all branches, transportation has been showing an increase every year (with the exception of 2006).

The Czech Republic has already implemented standard systemic measures conditioning the **growth of economic efficiency** (adjusting energy prices, stimulation measures for energy savings) and announced a national programme for economic energy management and the use of renewable and secondary resources of energy.

Upon the application of the measures of the **State Energy Concept**, energy **management will head towards** a high valuation of energy inputs. Energy intensity in GDP will decrease from 1.212 to 0.454 MJ.CZK^{-1}, i.e. to 37%.
The valuation of energy consumed for GDP will increase together with savings and energy management. Both factors will contribute to create a positive **development in energy intensity in GDP** and a fast convergence with the level found in other EU countries.

The expected **average decline in energy intensity in GDP** is 3.22% by 2030. The expected average annual rate of **electricity intensity in GDP** is 2.35% and **import energy intensity** is expected to increase to 57.8% by 2030.

DATA SOURCES

➜ The Czech Statistical Office
➜ Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1534)

The State Environmental Policy of the Czech Republic
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The State Energy Concept of the Czech Republic
http://www.mpo.cz/dokument5903.html

22/ Structure of electricity and heat generation

KEY QUESTION ➜

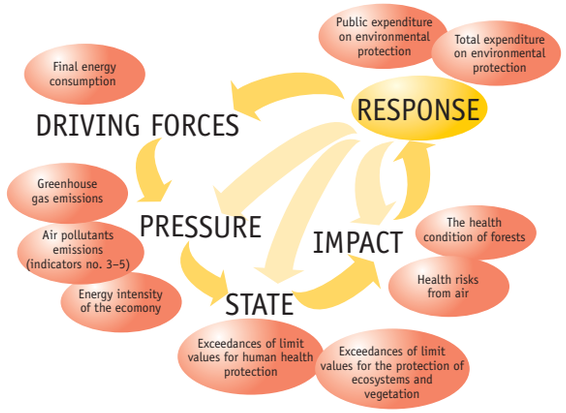
What is the mix of energy sources and what is the proportion of emission-free sources that do not pollute the air with emissions of pollutants and greenhouse gases?

KEY MESSAGES ➜

In the Czech Republic, 64% of electricity is produced from coal, i.e. from fossil fuels, whose combustion produces emissions of air pollutants. In recent years, the proportion has been stagnating or even slightly declining. The second largest source is nuclear fuel (31%).

The amount of energy from renewable sources is increasing every year. In 2008, electricity produced from renewable sources accounted for 5.17% of gross electricity consumption.

While total heat generation is declining each year, heat generation from renewable sources is significantly increasing.



OVERALL ASSESSMENT ➜

Change since 1990	
Change since 2000	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

One of the key objectives of the **European Union's energy policy** is maximizing the use of renewable sources.

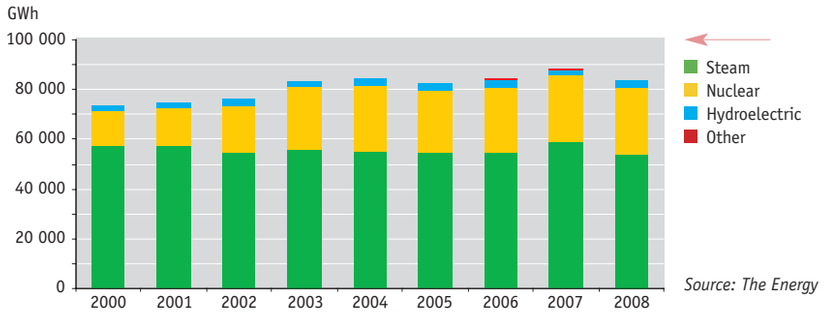
The **State Environmental Policy of the Czech Republic** aims for the maximum replacement of non-renewable sources with renewable sources. In the Accession Treaty that was signed in Athens in March 2003, the Czech Republic committed to achieving a minimum proportion of 8% of electricity from renewable sources in the Czech Republic's gross electricity consumption by 2010 and a 15% proportion by 2030.

Another objective is to achieve a 6% proportion of renewable energy sources (RES) in the total consumption of primary energy sources by 2010.

The **State Energy Policy of the Czech Republic** aims to prevent exceeding the threshold levels for energy import dependence (indicative targets):
– a maximum of 45% in 2010,
– a maximum of 50% in 2020,
– a maximum of 60% in 2030.

INDICATOR ASSESSMENT

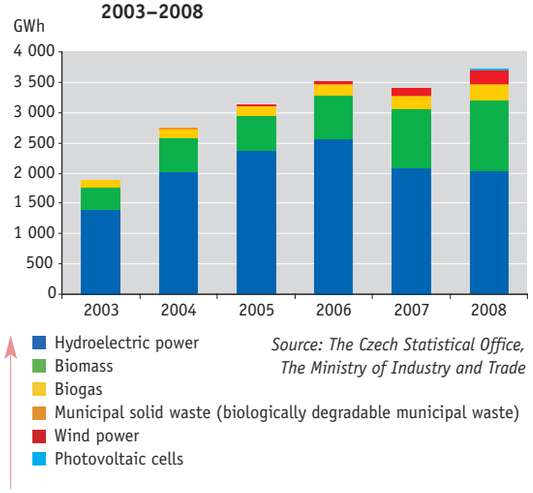
Chart 1 ➜ **Electricity generation according to type of power plant, the Czech Republic [GWh], 2000–2008**



Source: The Energy Regulatory Office

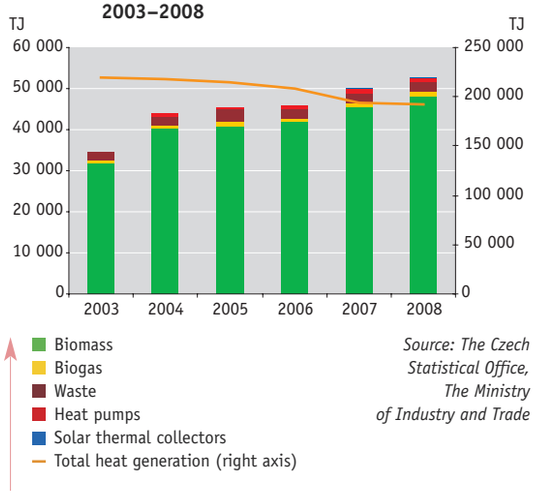
The Steam category includes gas-steam, gas and combustion power plants. The Other category includes wind, solar, geothermal and other alternative power plants.

Chart 2 ➜ **Electricity generation from renewable energy sources in the Czech Republic [GWh], 2003–2008**



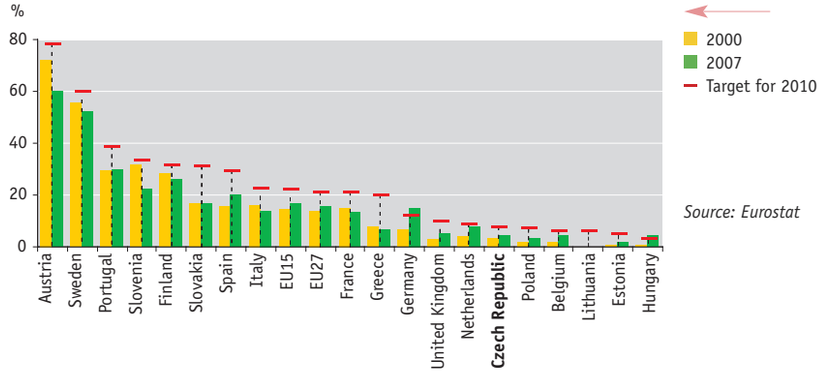
Source: The Czech Statistical Office, The Ministry of Industry and Trade

Chart 3 ➜ **Heat generation from renewable energy sources, total heat generation in the Czech Republic [TJ], 2003–2008**



Source: The Czech Statistical Office, The Ministry of Industry and Trade

Chart 4 ➜ **The proportion of renewable energy sources in gross electricity consumption, an international comparison [%], 2000, 2007**



Source: Eurostat

From 2000–2007, total electricity generation showed year-to-year fluctuations. In the last year-to-year period (2007–2008), total electricity generation decreased by 5.3%. The decrease was caused by reduced electricity generation by coal power plants. By contrast, other sources showed either an increase or stagnation in production.

In the Czech Republic, steam power plants continue to account for the largest proportion of **electricity generation** (64% in 2008, but an annual decline compared to 66.7% in 2007). Steam power plants burn – mostly – coal (mostly brown coal) and on a small scale also biomass, gas and oils. In 2008, 54 333 GWh of electricity was generated by steam power plants.

Nuclear power plants are second (the Dukovany and the Temelín nuclear power plants). With a total production of 26 551 GWh, they contributed 31% of electricity generation in 2008.

Every year, electricity generation **from renewable sources (RES)** is increasing in importance. In 2008, 3 726 GWh of electricity was obtained from RES, which corresponds to 4.4% of the total amount of electricity generated in the Czech Republic (in 2007, the proportion was 3.9%).

Industry and energy sector

The share of electricity generated from RES in gross electricity consumption in the Czech Republic showed a significant year-to-year increased from 4.77% in 2007 to 5.17% in 2008. However, this is still short of the indicative target (for 2010) of 8%.

By international comparison, the Czech Republic is among the EU countries with the lowest proportion of RES in total electricity consumption (Chart 4). The problem is the limited RES potential that is available in the Czech Republic – the possibilities for hydroelectric plants are not as great as in Norway or Austria and the possibilities for wind power plants are not as great as those in Germany. However, the potential for biomass use is comparable to other European countries.

The mix and the proportion **of renewable sources** are rather uneven. Electricity generation account for the highest proportion (54% of RES), followed by electricity generation from biomass (31%). Other sources are still relatively underused; they mainly include energy generation from biogas (7.1%), wind power (6.6%), photovoltaic cells (0.35%) and the incineration of municipal solid waste (0.30%).

In 2008, electricity exports amounted to 19 989 GWh, i.e. 23.9% of all production. In the same year, however, 8 521 GWh of electricity was imported. The balance of exports and imports is thus 11 469 GWh, i.e. 13.7% of the total amount of generated electricity (83 518 GWh).

Total heat generation in the Czech Republic is declining every year. Between 2003 and 2008, it dropped by 12.6%.

In the Czech Republic, solid biomass (91%) contributes the highest proportion to **heat energy** generation from RES, while the proportions of other RES in heat generation are considerably lower. The decisive factor in estimating heat generation from RES is the consumption of biomass by household.

Energy security includes everything the state must do in order to prevent threats to the steady supply of energy into the national economy. In the worst case, its interruption may lead to loss of life or enormous economic loss.

The Czech Republic is currently almost self-sufficient in electricity generation from coal since this raw material is mined domestically. Also, the Czech Republic exports both coal and electricity. At the same time, however, the Czech Republic is dependent on oil (94%) and gas (91%) supplies, and it also imports nuclear fuel for its nuclear power plants. More than two-thirds of oil and gas and all nuclear fuel is bought from Russia.

An increased proportion of energy from renewable sources leads to diversification in the composition of fuels that are used, which helps to improve the security of the energy supply. Using energy from renewable sources is now generally more expensive than using hydrocarbons, but the gap is narrowing, especially when the costs of climate change are taken into account.

The Czech Republic's **imports** of energy sources will increasingly exceed **exports**. At the end of the period (2030), energy imports will be dominated by nuclear fuel (35%) followed by natural gas (34%), liquid fuels (14.5%), and black coal and coke (9% of all imports of energy sources). The Czech Republic will be fully dependent on natural gas, oil and nuclear fuel, and highly **dependent** on black coal (55%). The Czech Republic's dependence on energy imports will nearly double.

DATA SOURCES

- ➜ The Czech Statistical Office
- ➜ The Ministry of Industry and Trade
- ➜ The Energy Regulatory Office
- ➜ Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1560)

The State Environmental Policy of the Czech Republic
http://www.mzp.cz/cz/statni_politika_zivotniho_prostredi

The State Energy Policy of the Czech Republic
http://www.mpo.cz/dokument5903.html

23/ Passenger and freight transport capacity

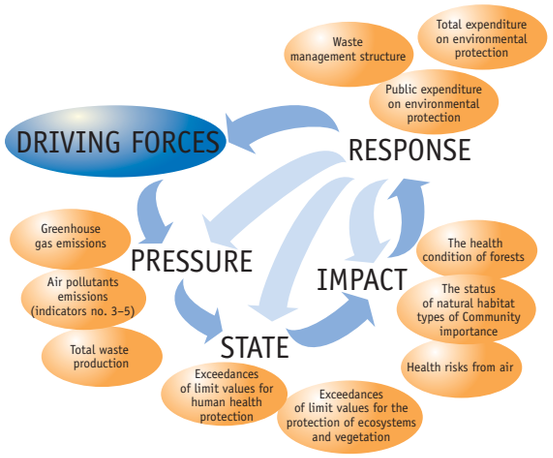
KEY QUESTION ➜

Has the share of environmentally friendly means of transportation in total passenger and freight transport capacities been increasing?

KEY MESSAGES ➜

The transport capacities of passenger car transportation have been increasing (by 1.2% on a year-to-year basis and by 13.2% compared to 2000). The capacity of air transport has been slowly increasing, namely by 2.5% on a year-to-year basis in 2008 and by 84% since 2000.
As far as freight is concerned, road transport has been increasing while railway transport has been decreasing. The year-to-year increase in road transport capacity in 2008 was 5.7%; the share in total transport capacity was 73.8%.

The share of public transport in total passenger transport capacity (excluding air transport) increased from 27.3% in 2006 and 2007 to 27.8% in 2008, which means the decline in the share of environmentally friendly means of passenger transport in total transport capacity was reversed.
In 2008, energy consumption in transport decreased on a year-to-year basis by 1.6% and after a significant period of growth since 1995, it is a turning point in the current trend. Energy consumption declined the most in passenger car transportation (by 3.6%). The decline is reflected in the significant year-to-year decrease of emissions from transport. This is even true for pollutants that were increasing in previous years. Electricity consumption by electrical transport decreased by 9.5%.



OVERALL ASSESSMENT ➜

Change since 1990	☹
Change since 2000	☹
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

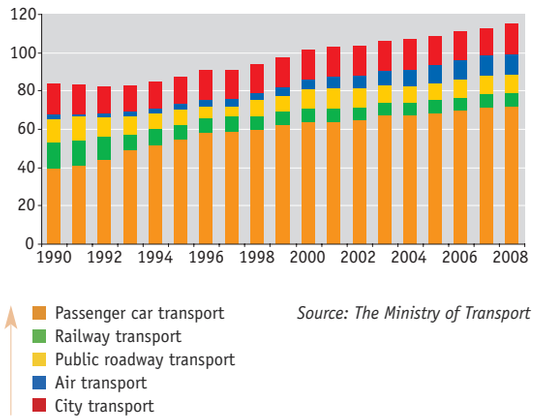
The objective of the applicable **State Environmental Policy of the Czech Republic** is to "...support a shift in the shares of passenger and freight transport in favour of environmentally friendly means of transport, such as railway, combined and public transport and cycling".

The Transport Policy of the Czech Republic 2007–2013 sets the following rules for transport development: "When preparing legislative and economic instruments to regulate transport and develop infrastructure, the aim has to be at the optimization of transport systems that will develop those means of transport that are more environmentally friendly and comply with sustainable development requirements while respecting the financial limits of the Czech Republic's public budgets." Basic topics of the transport policy also include "the harmonisation of conditions on the transport market, the modernization, development and recovery of railway, the improvement of road transport, reducing impacts of transport on the environment and public health, the development of urban, suburban and regional transport within the integrated transport system and the orientation of research on safe, reliable and environmentally friendly transport. "

The objectives are not quantified either in the applicable State Environmental Policy of the Czech Republic or in the Transport Policy of the Czech Republic.

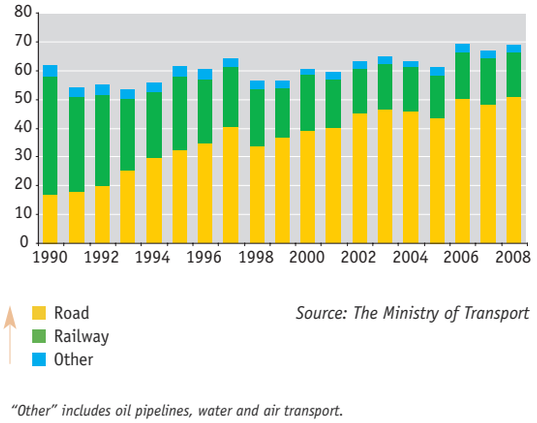
INDICATOR ASSESSMENT

Chart 1 ➜ **Development of transport capacities and the structure of passenger transport in the Czech Republic [billions of pkm], 1990–2008**



Source: The Ministry of Transport

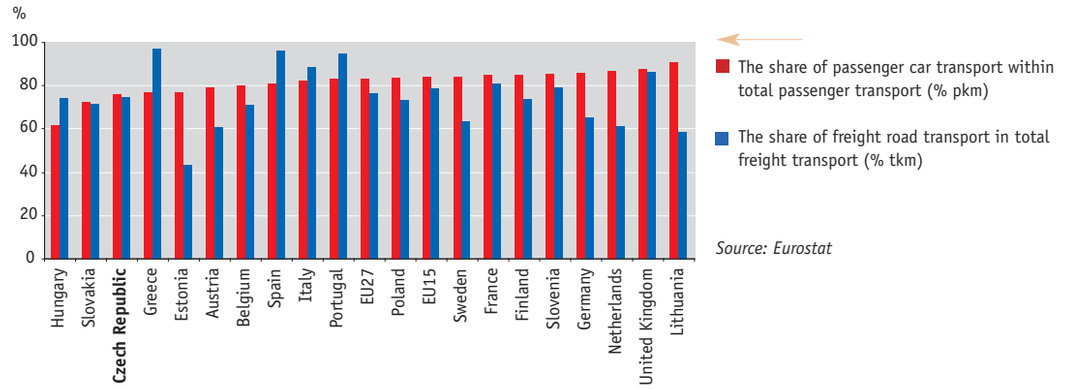
Chart 2 ➜ **Development of transport capacities and the structure of freight transport in the Czech Republic [billions of tkm], 1990–2008**



Source: The Ministry of Transport

"Other" includes oil pipelines, water and air transport.

Chart 3 ➜ **An international comparison of passenger car transport share in total passenger transport capacities and freight road transport in total freight transport capacities [%], 2007**



Source: Eurostat

Data for an international comparison for 2008 are not available.

As far as the **structure of passenger and freight transport capacities** of the Czech Republic is concerned, environmentally unfriendly means of transport continue to dominate. In 2008, **the transport capacities of passenger car transportation** continued to grow; on a year-to-year basis it increased by 1.3%. The passenger car transportation share in total passenger transport capacities reached 62.9%, which is less than in 2000 (63.3%). Air transport continued to grow (by 2.5%), which is a lower rate than in the previous decade. Railway passenger transport capacities have been stagnating since 2000, and on a year-to-year basis, they dropped by 1.5% in 2008. A significant increase was reported in public transportation, namely by 10.6% on a year-to-year basis. This development was significantly influenced by the results of new transport research into the usage of underground light rail carried out in 2008. According to the research, the average transport distance on underground light rail grew from 6.1 km to 7.5 km, as did transport capacities. As far as the structure of public transport capacities is concerned, more environmentally friendly (electrical) means of transport dominate – 64.6% in 2008, compared to 62.1% in 2000.
Overall, the **share of more environmentally friendly means of transport** (railway transport, public transport and line buses, including the integrated transport system) in total passenger transport capacities in the Czech Republic is approximately 27–28%. After a sharp drop in the 1990s and a slight decline in 2000, the share has been more or less stable since. The fact that the share of environmentally friendly means of transport has not been decreasing is certainly positive.

As far as **freight** is concerned, **the growth of road freight** resumed in 2008, while railway freight decreased. Total freight transport capacities in the Czech Republic grew by 3.1% on a year-to-year basis; road freight transport by increased by 5.7% while railway transport decreased by 2.2%. The share of freight road transport in total transport capacities accounted for 73.8% (by 1.9 % more than in 2007).

In 2008, approximately CZK 66 billion was invested into road infrastructure and CZK 39 billion into railway infrastructure from public budgets.

After a longer period of slight growth, 2008 reported a **year-to-year decline in energy consumption in transport** (excluding electric traction) by 1.6%. The largest energy decrease was registered in the passenger car transportation (by 3.6%); there was also a slight decline in energy consumption in freight road transport (by 0.6%). Generally, passenger car transportation uses approximately 51% of all energy consumed in transport. In freight road transport, it is approximately 30%. The decline in energy consumption is related to the **significant year-to-year decrease in emissions of all transport pollutants** (according to preliminary data provided by the Transport Research Centre). In 2008, CO_2 emissions decreased by 2.3%, CO by 9.4%, NO_x by 6.6%, VOC by 14.1%, CO_2 by 3.9% and PM by 4.2%. This positive development was significantly promoted by high fuel prices caused by high oil prices on international markets (with the exception of the 4th quarter of 2008, when both oil and fuel prices went down) and related fuel savings (e.g. the preference of smaller vehicles with lower consumption). Towards the end of the year, industrial production declined and this was reflected in freight transport.

Within the EU27 context, the Czech Republic has a slightly above average share of passenger car transportation in domestic passenger transport (according to the Eurostat methodology, excluding air transport). In 2007, it was approximately 75%, while the EU27 and EU15 averages were 83% and 84% respectively. As far as the share of freight road transport in total freight transport capacities, data across the EU vary a lot more. When compared to the Czech Republic, the average values are analogical. Passenger car transportation capacities per capita (approximately 6 940 pkm/capita) continue to be much lower than in most western European countries (usually over 10 000 pkm/capita). The data prove that the development of transport and prevalence of environmentally unfriendly means of transport are problematic throughout most of the EU and that the Czech Republic's situation is standard.

With respect to the current economic situation (both in the Czech Republic (the EU) and globally), total freight transport capacities can be expected to decrease in 2009. In line with the applicable State Energy Concept, railway transport is supposed to become stronger at the expense of road transport. Passenger transport capacities and their structure are likely to stagnate. Further use of integrated transport systems in public transport can be anticipated and more people will commute into large cities from places where passenger vehicles are typically used. Further development of transport's environmental impacts will depend on measures concerning the composition of fleets, especially with the rotation and number of newer vehicles that comply with stricter emission standards. The Parliament of the Czech Republic created legislative conditions to promote the scrappage of cars older than 10 years (an amendment to the Waste Act was passed); however, actual implementation is subject to further political negotiations.

DATA SOURCES

- The Transport Research Centre (a public research institution)
- The Czech Statistical Office
- The Automotive Industry Association of the Czech Republic
- The Ministry of Transport of the Czech Republic

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1587)

The Transport Yearbook of the Czech Republic
http://www.sydos.cz/cs/rocenky.htm

Publications by the Transport Research Centre
http://www.cdv.cz/publikace

The Ministry of Transport of the Czech Republic
http://www.mdcr.cz

2007 Prague Transport Yearbook
http://www.rd2007.xf.cz/rd2007.pdf

24/ Structure of the passenger-car and truck fleet

KEY QUESTION

Has there been improvement in the environmental specifications of the road vehicle fleet?

KEY MESSAGES

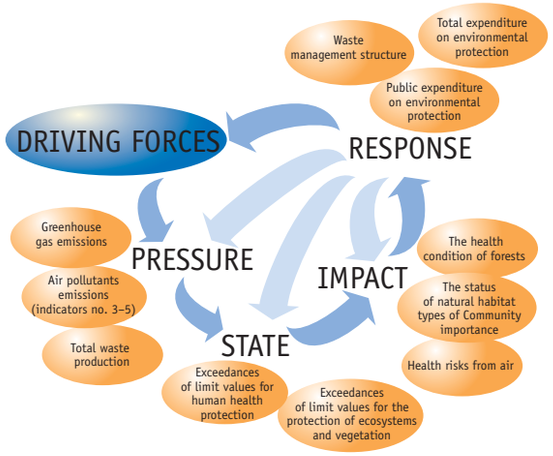
The Czech Republic's passenger-car fleet is among the oldest in Europe. Most registered automobiles are older than 10 years – in 2008, this was 58.9% (about 2.6 million vehicles).

In 2008, approximately 30% of all cars, 40% of all buses and nearly one-half of all trucks did not meet any EURO emission standards. The fleet thus remains emission-intensive.

In 2008, the renewal of the passenger-car fleet accelerated to 4%, 78 000 more vehicles were scrapped from the central register of vehicles than in the previous year.

The age structure of the truck fleet is becoming younger, the proportion of vehicles less than 2 years old is increasing – in 2008, their proportion in the total number of registered trucks was about 22%.

Compared to 2007, the consumption of alternative fuels substantially increased in 2008 mainly due to the mandatory blending of 2% ethanol into motor petrol.



OVERALL ASSESSMENT

Change since 1990	☹
Change since 2000	☹
Last year-to-year change	☹

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

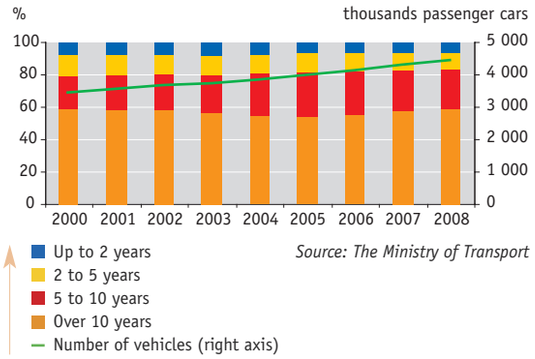
The current applicable State Environmental Policy of the Czech Republic aims to „...promote the use of alternative fuels (especially in urban public transport), including the construction of the distribution network, so that their proportion is at least 20% in 2020."

The main legislative measure for reducing emissions from new cars is the **European emission standards**, which the Czech Republic as an EU member state must meet. This is a set of regulations and requirements that set limits for the composition of the exhaust gases of all cars that are produced in EU member states. The objective is to gradually reduce the amount of nitrogen oxides (NO_x), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM) in emissions. While a limit on carbon dioxide (CO_2) emissions is not yet included in this package, an agreement on the procedure for gradually reducing these emissions was reached late last year. The first directive entitled EURO 1 entered into force in 1993, the EURO 5 directive has been in effect since September 2009. New cars must meet emission standards that came into effect in the year in which they were produced.

Under the current agreement of the European Commission, Council and Parliament, **CO_2 emissions** in new vehicles are to be gradually reduced by 25% by 2015, i.e. from the current average of 160 g/km to 120 g/km. This target should be met by 65% of automobiles by 2012, and by all produced automobiles by 2015. The reduction to 130 g/km is to be achieved through new engine technology and the remaining 10 g/km through additional technical improvements such as tyre resistance, aerodynamics, etc. The original proposal by the European Commission was to implement the limit by 2012.

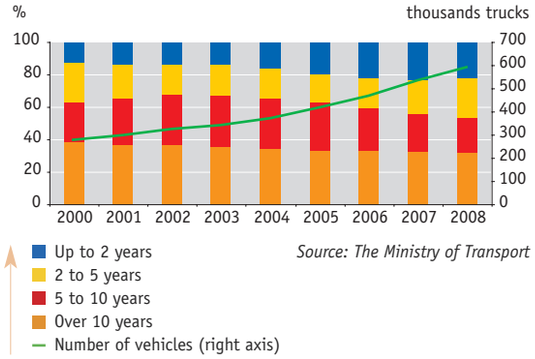
INDICATOR ASSESSMENT

Chart 1 ➜ **The age of passenger cars [%] and the size of the passenger-car fleet in the Czech Republic, 2000–2008**



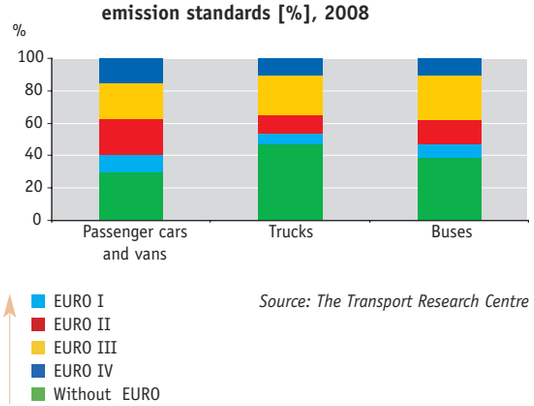
Source: The Ministry of Transport

Chart 2 ➜ **The age of trucks [%] and the size of the truck fleet in the Czech Republic, 2000–2008**



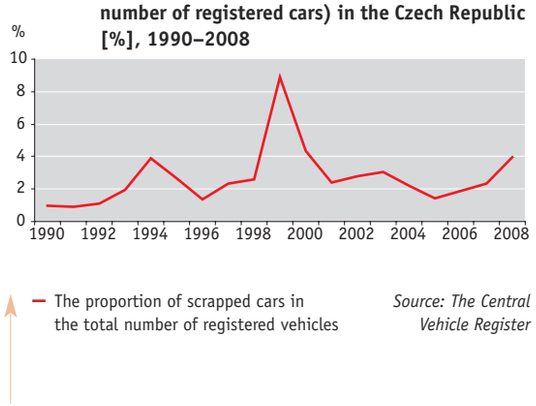
Source: The Ministry of Transport

Chart 3 ➜ **Compliance of passenger car, bus and truck fleets in the Czech Republic with individual EURO emission standards [%], 2008**



Source: The Transport Research Centre

Chart 4 ➜ **The annual renewal of the passenger-car fleet (the proportion of scrapped cars in the total number of registered cars) in the Czech Republic [%], 1990–2008**



Source: The Central Vehicle Register

The fleet of passenger cars and **trucks** (including vans) continues to grow, with a year-to-year increase in registrations of 3.2% to 4.42 million vehicles and 9.4% to 590 000 vehicles respectively. This also leads to an increased burden on the road network, higher incidences of congestion, and pressure for the extension of road infrastructure. This is associated with negative environmental impacts such as the appropriation of agricultural land for non-agricultural purposes and landscape fragmentation with a risk of ecosystem and biodiversity disruption. According to the Road and Motorway Directorate, about 313 ha of agricultural land and 33 ha of forest land was appropriated for road transport infrastructure in 2008. Since 2000, at least 4 836 ha of agricultural land and 394 ha of forest land has been appropriated. About 40 kilometres of new motorways and high-speed roads was completed in 2008, and 253 km since 2000.

Despite some slight positive year-to-year changes, both the age structure and the average age of the passenger-car fleet remain unfavourable; the Czech Republic's fleet is one of the oldest in the EU. The age structure of the truck fleet is developing more favourably. The proportion of vehicles up to 2 years of age is increasing (it was about 22% in 2008), and the share of older vehicles is declining.

Following a period of fluctuation and stagnation, **the renewal of the fleet** of passenger cars showed a **marked year-to-year increase** from 2.3% to 4% (Chart 4). In 2008, 176 317 vehicles were permanently removed from the register, i.e. about 78 000 more than in 2007. This is probably the result of both the introduction of fees for the registration of vehicles not meeting EURO 3 or higher emission standards, and the permanent removal of vehicles that are illegally uninsured (and usually unused) from the registry. The **average age of passenger cars** showed a slight year-to-year decrease to 13.82 years, mainly due to faster renewal.

The longer-term **trend in the age structure of the passenger-car fleet** since 2000 is characterized (Chart 1) by **minimal changes in**

the proportions of individual age groups of vehicles. The Czech Republic's main problem is that more than one-half the fleet (about 59%, i.e. about 2.6 million vehicles) consists of vehicles that are older than 10 years, which is one of the highest levels in the EU27 (on average, the proportion of these vehicles is nearly 30%).

The unfavourable age structure of the fleet is reflected in its emission characteristics (Chart 3). Roughly one-third of registered passenger cars and buses, and one-half of trucks fail to meet any EURO emission standards. By contrast, only about one-third of registered vehicles meet the currently toughest EURO 3 or higher emission standards.

With regards to the structure of the fleet according to propulsion, 72.7% of the fleet of all road vehicles ran on petrol and 25.2% were diesels in 2008. The proportion of diesels is gradually increasing, thus leading to the increased emission of particulates. The proportion of alternative propulsions in the fleet was very small and, with the exception of electromobiles that experienced a year-to-year increase by 500 vehicles to a total of 700 vehicles, shows no significant changes. LPG (including converted gasoline engines) accounts for the largest proportion, about 2%. CNG accounts for only 0.02% (1700 vehicles), probably due to the inadequate amount of service stations.

In 2008, **the consumption of motor petrol and motor diesel** (including non-transport) decreased by 3.8% (from 2 099 kt to 2 019 kt) and by 0.8% (from 4 071 kt to 4 039 kt) respectively compared to 2007. By contrast, between 2007 and 2008, the consumption of biodiesel soared from 34 000 to 85 000 t (since 1 September 2007, mandatory 2% biodiesel blending into diesel has been in effect), bioethanol consumption jumped from 300 to 54 000 t (since 1 January 2008, mandatory 2% ethanol blending into petrol has been in effect), LPG consumption increased from 77 000 to 78 000 t and CNG from 3 400 to 4 700 t.

The future development of the Czech Republic's fleet will largely depend on measures taken to accelerate the scrapping of vehicles over 10 years of age and to reduce the registrations of older vehicles that are emission intensive. Due to the economic recession, it can be expected that registrations of new vehicles will decline, and any fleet rejuvenation can thus only be expected in the case of accelerated replacement. Given the envisaged growth in transport performance, the mix of the road vehicle fleet will be crucial to the development of the environmental burden from transport, especially with regard to the impact on air quality. In 2008, the Parliament of the Czech Republic laid down the legislative framework for supporting the depreciation of vehicles over 10 years of age in the form of 'scrap money' (an amendment to the Act on Waste was approved), but its actual implementation is still subject to political negotiation.

It can be expected that the proportion of road-transport performance delivered by some types of alternatively powered vehicles, especially compressed natural gas (CNG), will increase. However, the possibilities of a number of other alternative propulsions are severely limited for objective reasons. Therefore, there is a real possibility that increasing their proportion in fuel and energy consumption in transport to 20% by 2020, as required by the State Environmental Policy of the Czech Republic, will not be accomplished.

DATA SOURCES

- ➜ The Transport Research Centre
- ➜ The Ministry of Transport of the Czech Republic
- ➜ The Czech Statistical Office
- ➜ The Automotive Industry Association of the Czech Republic
- ➜ The Central Vehicle Register

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

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Transport Yearbooks of the Czech Republic
http://www.sydos.cz/cs/rocenky.htm

The Automotive Industry Association
http://www.autosap.cz

Transport Research Centre Publications
http://www.cdv.cz/publikace

The Ministry of Transport of the Czech Republic
http://www.mdcr.cz

The Yearbook of Transportation Prague 2007
http://www.rd2007.xf.cz/rd2007.pdf

25/ Consumption of inorganic fertilizers and plant protection products

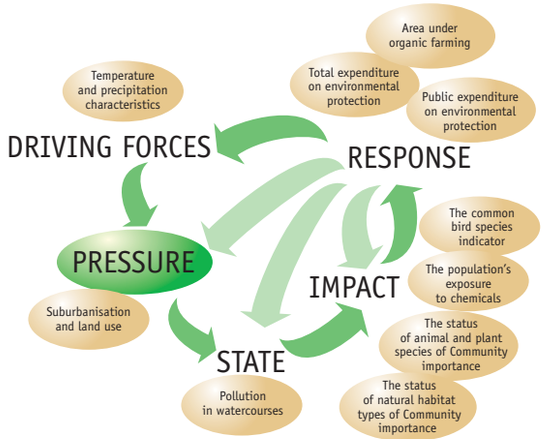
KEY QUESTION ➜

Is the amount of agrochemicals used in agricultural activities decreasing?

KEY MESSAGES ➜

Following a marked decline in the early 1990s that was due to the transformation of agricultural and poor economic situation of agricultural enterprises, the consumption of inorganic fertilizers and plant protection products has been gradually increasing. The trend in the consumption of inorganic fertilizers and plant protection products is not favourable.

In 2008, the consumption of inorganic fertilizers and plant protection products showed little year-to-year change.



OVERALL ASSESSMENT ➜

Change since 1990	😐
Change since 2000	☹
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

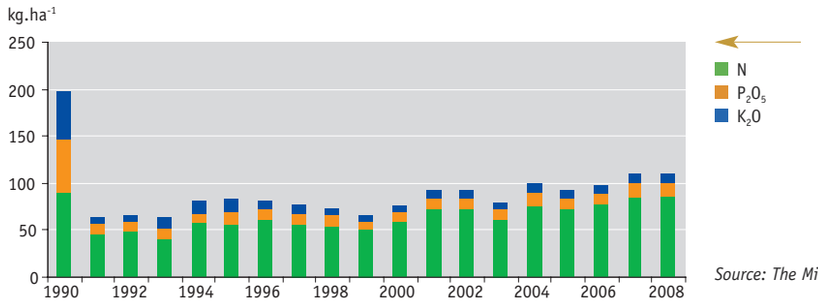
The State Environmental Policy of the Czech Republic sets the objective of promoting good agricultural practices that include planning the entry of contaminants into the environment and achieving low concentrations of contaminants in the environment with minimal impacts on human health and ecosystems.

Through Decision No 1600/2002/EC laying down the Sixth Community Environment Action Programme, the European Parliament and the Council state that the use of plant protection products in agriculture affects human health and the environment and needs to be further reduced. Therefore, **a package of three legal regulations** is being prepared that includes a regulation of the European Parliament and of the Council concerning the placing of plant protection products on the market, a directive of the European Parliament and of the Council establishing a framework for Community action to achieve the sustainable use of pesticides and a regulation of the European Parliament and of the Council concerning statistics on plant protection products. The above regulations will introduce much stricter criteria for product registration and, at the same time, regulate the use of the products and the assessment of their impacts on human and animal health and on the environment.

Other significant documents in this area include **Regulation (EC) No 2003/2003** relating to fertilisers (Text with EEA relevance) and **Directive 91/414/EEC** concerning the placing of plant protection products on the market.

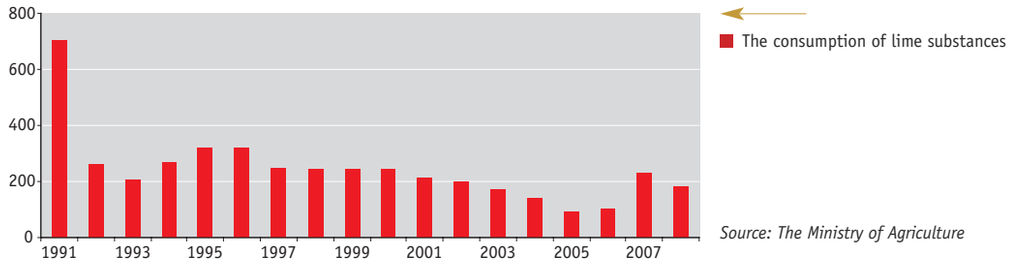
INDICATOR ASSESSMENT

Chart 1 ➜ **The consumption of inorganic fertilizers in the Czech Republic [kg.ha^{-1}], 1990–2008**



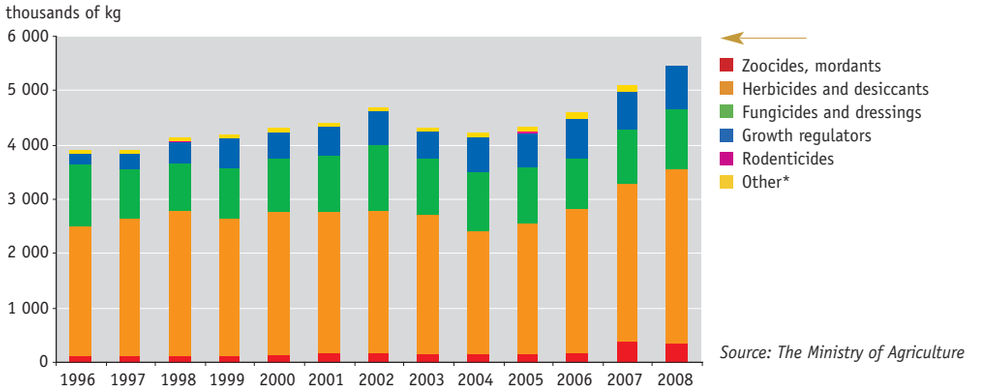
Source: The Ministry of Agriculture

Chart 2 ➜ **The consumption of lime substances in the Czech Republic [thousands of tonnes], 1991–2008**



Source: The Ministry of Agriculture

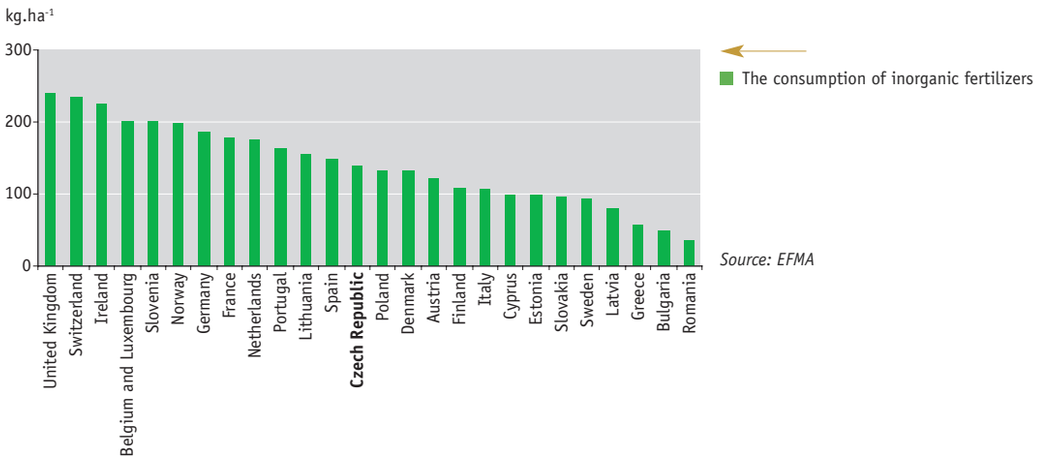
Chart 3 ➜ **The consumption of plant protection products in the Czech Republic [thousands of kg of active ingredient], 1996–2008**



Source: The Ministry of Agriculture

** Other – auxiliary ingredients, repellents, mineral oils etc.*

Chart 4 ➜ **The consumption of mineral fertilizers in Europe [kg.ha^{-1}], 2006**



Source: EFMA

The consumption of inorganic fertilizers

The consumption of inorganic fertilizers that contribute to water and soil contamination declined sharply after 1991. Since then, the consumption of phosphate and potash fertilizers has been constant. However, in subsequent years, the consumption of nitrogen fertilizers gradually increased (with a few exceptions), and it currently equals 95% of the original consumption. In 2008, total inorganic fertilizer consumption was 110.6 kg of pure nutrients per 1 ha of agricultural land. The pure-nutrient consumption in individual categories was 85.4 $kg.ha^{-1}$ for nitrogen fertilizers (as the content of N – nitrogen), 13.8 $kg.ha^{-1}$ for phosphate fertilizers (as the content of P_2O_5 – phosphorus oxide) and 11.4 $kg.ha^{-1}$ for potash fertilizers (as the content of K_2O – potassium oxide). Compared to 2007, the total consumption of inorganic fertilizers stagnated or, more precisely, increased by 1%. However, it grew by 46% from 2000. The consumption of inorganic fertilizers is shown in Chart 1.

In 2008, **the consumption of lime substances** totalled 180 000 tonnes. After a marked increase in 2007, it dropped by 27%, and by 35% from 2000 (Chart 2). The consumption of lime substances depends on the current need to increase the pH of higher-acidity soil, and is also affected by the financial situation of farmers and edification. The reasons for the negative reduction in soil pH include, among other things, emissions of acidifying substances, see indicator 3.

Compared to other European countries, the Czech Republic has average inorganic fertilizer consumption levels (Chart 4). Fertilizer consumption depends – above all – on climatic conditions and the intensity of agricultural activities in individual countries, as well as on the financial strength of farming entities.

The consumption of plant protection products

The largest amount of **plant protection products** was applied in 1990, when total consumption reached 20 888 000 kg (l) – unit according to the product type. In 2008, 11 072.8 thousands kg (l) of plant protection products were applied as treatment of field crops. 3.83 kg (l) of products (i.e. 1.81 kg of active ingredients) were applied to each ha of agricultural land. The total annual consumption of the products increased by 3%, and by 15% since 2000. The trend in consumption is shown in Chart 3. In 2008, 19 820 ha of arable crops were treated with biological products, which are mainly used in organic farming and integrated agricultural production, i.e. 2.75 times more than in the previous year. Their increased consumption is probably linked to the growing area of organically farmed agricultural land.

In OECD countries, the consumption of plant protection products is generally substantially higher than in the Czech Republic.

The marked decline in consumption of inorganic fertilizers and plant protection products in the early 1990s was due to the transformation of agriculture, particularly the poor economic situation of agricultural primary-production enterprises that lacked financial resources for purchasing chemicals. Other factors that influenced the situation, especially in subsequent years, included the dissemination of new scientific knowledge and technologies from abroad and efforts to approximate to EU legislation and reduce negative environmental impacts of pesticides. The per-hectare burden on soil was also reduced thanks to a new generation of plant protection products that have significantly lower dosage per ha and lower toxicity.

The current trend in consumption of inorganic fertilizers and plant protection products is not favourable; there has been no success in reducing their consumption. The forthcoming **legislative package of legal regulation**s might bring some improvement since it introduces stricter criteria for registration of plant protection products and regulates their use.

While inorganic fertilizers and plant protection products increase yields in agricultural production, they are also a source of soil contamination and – due to surface runoff – they contribute to polluting both surface water and groundwater. They also contribute to 'anthropogenic eutrophication' in the case of nitrogen fertilizers. Intensive agricultural activity can lead to reduced biodiversity of soil microorganisms and a decline in the populations of bird species that are adversely affected by soil nitrogen, as nitrogen accumulates in the food chain and may result in the weakening of eggshells and egg damage. Agrochemicals enter into food through the food chain.

DATA SOURCES

- The Ministry of Agriculture
- The State Phytosanitary Administration
- EFMA, The European Fertilizer Manufactures Association
- Kazda, J. (2005) Chemická ochrana rostlin a předpisy (Chemical plant protection and regulations)
- Primack, R. B., Kinddlmann, P., Jersáková, J. (2001) Biologické principy ochrany přírody (Biological principles in nature conservation), Prague: Portál, 349 p.

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators

http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1608)

The Report on the Condition of Agriculture in the Czech Republic in 2008 "The Green Report"

26/ Area under organic farming

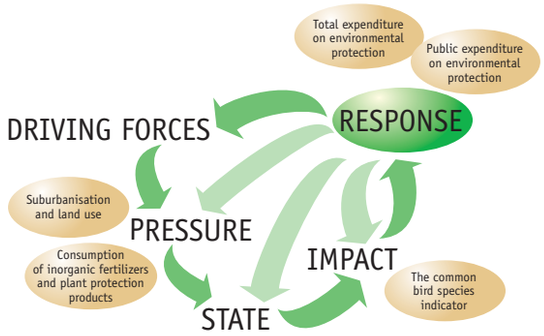
KEY QUESTION

Is the proportion of agricultural land under organic farming increasing?

KEY MESSAGES

The area under organic farming and the number of organic farms has been increasing over the long-term. The trend in organic farming in the Czech Republic is positive.

In 2008, the area under organic farming increased by 29 000 ha; its proportion in the total area of agricultural land reached 8.04 % and the number of organic farms rose to 1 946. It is expected that the target of the State Environmental Policy of the Czech Republic will be accomplished.



OVERALL ASSESSMENT

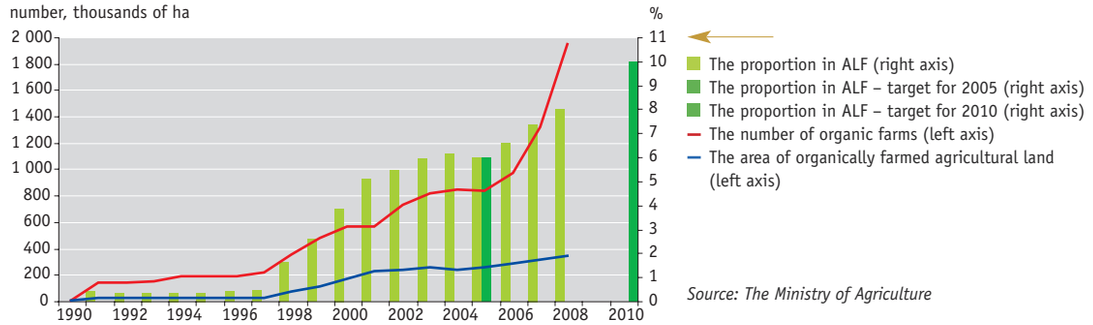
Change since 1990	
Change since 2000	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

The State Environmental Policy of the Czech Republic sets the objective of increasing the proportion of agricultural land under organic farming to at least 6% by 2005 and to at least 10% by 2010.
The rules for organic farming and the labelling of organic products are laid down by **Council Regulation (EC) No 834/2007** on organic production and labelling of organic products. **Council Regulation No 1257/1999** on support for rural development allows the Czech Republic (i.e. after EU accession) to draw financial resources for rural support from the Guarantee Section of the EAGGF (European Agricultural Guidance and Guarantee Fund).
The Action Plan of the Czech Republic for the Development of Organic Farming by 2010 supports those areas of organic farming that are insufficiently developed, for example research and education for farmers, supplying the domestic market with organic farming products, public awareness etc. In addition, one of the objectives is to achieve an approximately 10% share of area under organic farming in the total area of agricultural land by 2010.

INDICATOR ASSESSMENT

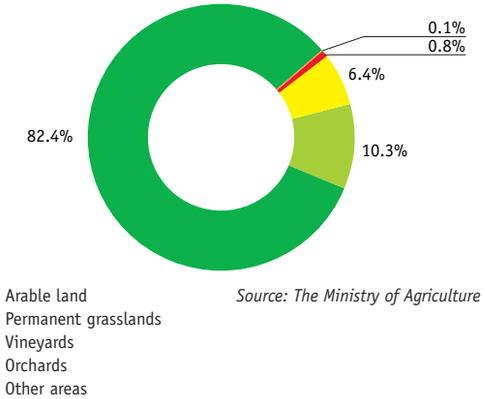
Chart 1 → **Organic farming in the Czech Republic [number, thousands of ha, %], 1990–2008**



Source: The Ministry of Agriculture

ALF – agricultural land fund

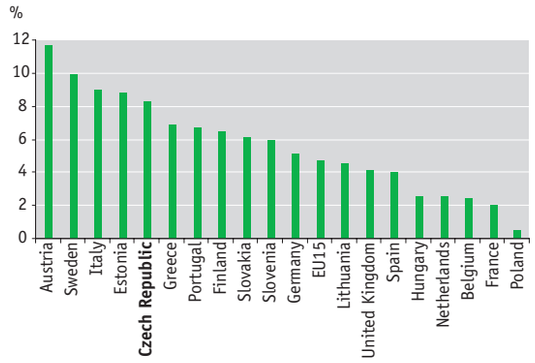
Chart 2 ➜ **The structure of land resources in organic farming in the Czech Republic [%], 2008**



Source: The Ministry of Agriculture

Despite the high proportion of permanent grasslands in total organically farmed agricultural land, permanent grasslands play an irreplaceable role that affects the quantity and the quality of groundwater and surface water, in erosion-control and flood-control measures and in significantly protecting biodiversity. Expanding, restoring and maintaining grass communities in the landscape represents one of the possible solutions to agricultural overproduction and – at the same time – land conservation.

Chart 3 ➜ **The proportion of area under organic farming in the total area of agricultural land in Europe [%], 2007**



Source: Eurostat

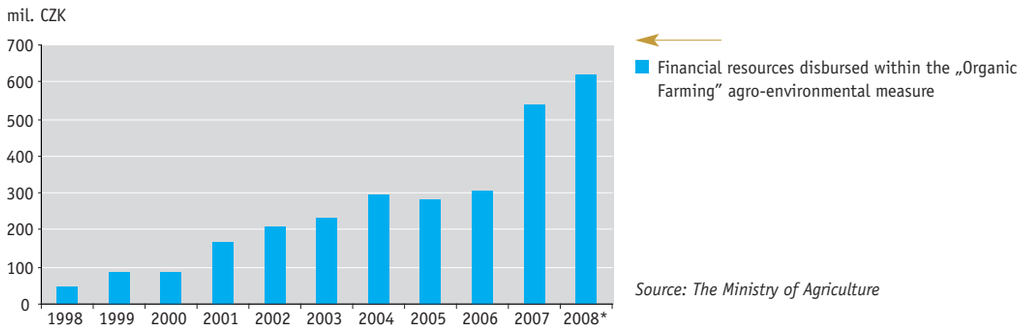
Table 1 ➜ **The amount of organic farming subsidies per unit of area [CZK.ha^{-1}], 2004–2008**

Culture	2004–2006 (HRDP*) [CZK.ha^{-1}]	2008 (RDP**) [CZK.ha^{-1}]
Arable land	3 520	4 086
Permanent grasslands	1 100	1 872
Vegetables and special herbs on arable land	11 050	14 869
Permanent cultures (orchards, vineyards)	12 235	22 383

** The Horizontal Rural Development Plan (HRDP)*
*** The Rural Development Programme (RDP)*

Source: The Ministry of Agriculture

Chart 4 ➜ **Financial resources disbursed within the „Organic Farming" agro-environmental measure [CZK million], 1998–2008**



Source: The Ministry of Agriculture

** The amount applied for in 2008.*

Over the long-term, the importance of **organic farming** in the Czech Republic has been growing. In 2008, there was a further increase in the number of organic farmers and producers of organic food. By the end of the year, there were 1 946 farmers that were farming according to set principles of organic farming and 422 entities were producing organic food. Throughout 2008, the number of organic farmers increased by almost 50% and the number of organic food producers almost doubled. The area under organic farming increased by 29 000 ha and reached 341 632 ha, representing 8.04% of the total area of agricultural land resources (Chart 1). In 2008, the number of organic fruit and wine growers increased; the area of organic orchards reached 2 764 ha, i.e. 13% of the total area of orchards, and the area of organic vineyards reached 341 ha, i.e. 2.5% of the total area of vineyards. The structure of land resources under organic farming is shown in Chart 2. Cattle breeding without commercial milk production accounts for the largest proportion of organic farming.

According to forecasts by the Ministry of Agriculture, **the target of the State Environmental Policy of the Czech Republic** for 2010 will be accomplished in advance. The target for 2005 had already been accomplished in 2003.

Compared to other European countries, the proportion of organically farmed land is above average in the Czech Republic (Chart 3).

The significant growth of organic farming is mainly due to the resumption of **state subsidies.** In 2008, state subsidies was disbursed from the 2007–2013 Rural Development Programme (RDP). This mainly included traditional support for organic farmers, i.e. subsidies per area that was included in the transition period or in organic farming and that was included in Axis II of the RDP, and also a significant point bonus for organic farmers in evaluating investment projects within Axes I and III of the RDP. The measures within Axis I in which organic farmers received point bonuses included the "Modernisation of agricultural holdings" and the "Setting up of young farmers". In Axis III these were the "Encouragement of tourism activities" (agrotourism) and the "Diversification into non-agricultural activities" measures. The amount of organic farming subsidies per unit of area and the financial resources disbursed within the "Organic Farming" agro-environmental measure are shown in Table 1 and Chart 4.

In addition, each year the Ministry of Agriculture financially supports the education of organic farmers and organic food producers. Educational activities are mainly implemented by non-governmental organizations. Greater awareness and better availability of information is another reason behind the increased number of organic farmers and organic food producers.

In order to promote organic farming, the European Commission adopted the **European Action Plan for Organic Food and Farming** in 2004. The Czech Republic adopted its **national action plan for organic farming** in advance of the European Action Plan, took an active part in drafting the European Action Plan, and has been successful in meeting the targets of both plans.

Organic farming is positively reflected in the sustainability of soil quality, into which organic matter is supplied. Organically farmed land is not burdened by chemicals or compaction. This improves the quality of produced food. Areas in which organic farming is performed have positive effect on the landscape function and character and contribute to biodiversity conservation and sustainable rural development.

DATA SOURCES

➜ The Ministry of Agriculture
➜ Eurostat, The Statistical Office of the European Union
➜ Šarapatka B., Hejduk, S., Čížková, S. (2005) Trvalé travní porosty v ekologickém zemědělství (Permanent Grasslands in Organic Farming), Šumperk: PRO–BIO Association of Ecological Farmers, 24 p.

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1606)

The Report on the Condition of Agriculture in the Czech Republic in 2008 "The Green Report"

27/ Domestic material consumption

KEY QUESTION ➜

Is the environmental burden associated with material consumption decreasing?

KEY MESSAGES ➜

In the Czech Republic, the environmental burden associated with the consumption of materials showed a downward trend from 1990–2002.

Between 2003 and 2007[1] , the trend reversed and the environmental burden started increasing again. Between 1991 and 2007, there was an increase in the proportion of imports in domestic material consumption, namely from 10.5% to 31.8%. The Czech Republic's material dependence on imports thus increased.

OVERALL ASSESSMENT ➜

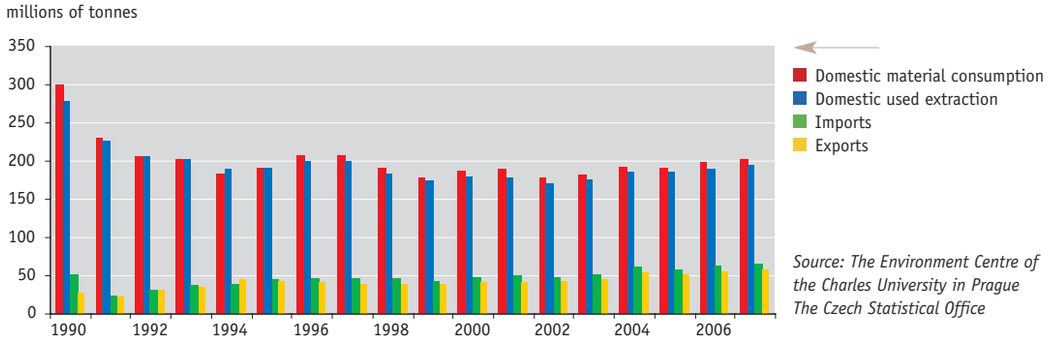
Change since 1990	😐
Change since 2000	😕
Last year-to-year change	😕

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Thus far, no specific numerical targets have been set for domestic material consumption or material dependence on imports. Documents such as the **State Environmental Policy of the Czech Republic**, the **Raw Material Policy** in the Field of Mineral Materials and Their Resources, the **State Energy Policy of the Czech Republic**, the Economic Growth Strategy of the Czech Republic and the Sustainable Development Strategy of the Czech Republic proclaim the need to reduce material consumption and maintain a certain level of raw-material and material dependence. At the international level, specific numerical targets have been adopted in Japan, Germany and Italy. The need to reduce material consumption and the environmental impacts associated with such consumption has been highlighted by the EU **Sustainable Development Strategy,** the **Thematic Strategy on the sustainable use of natural resources** and the **Recommendation of the OECD Council on material flows and resource productivity**. However, no international standards have yet been set for this area.

INDICATOR ASSESSMENT

Chart 1 ➜ **Domestic material consumption and its components[2] in the Czech Republic [millions of tonnes], 1990–2007**

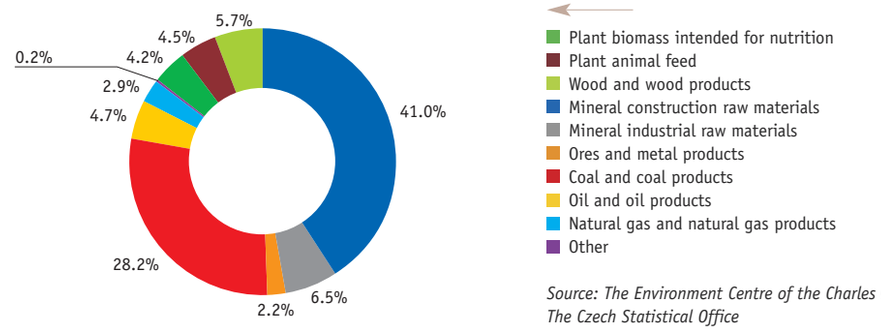


Source: The Environment Centre of the Charles University in Prague
The Czech Statistical Office

[1] *Due to emission reporting procedures, data for 2008 are not available.*

[2] *DMC is calculated as 'used domestic extraction', i.e. materials that enter the economic system, plus imports minus exports. The level of used domestic extraction is in direct proportion to the burden and the impacts that are associated with the use of renewable and non-renewable resources.*

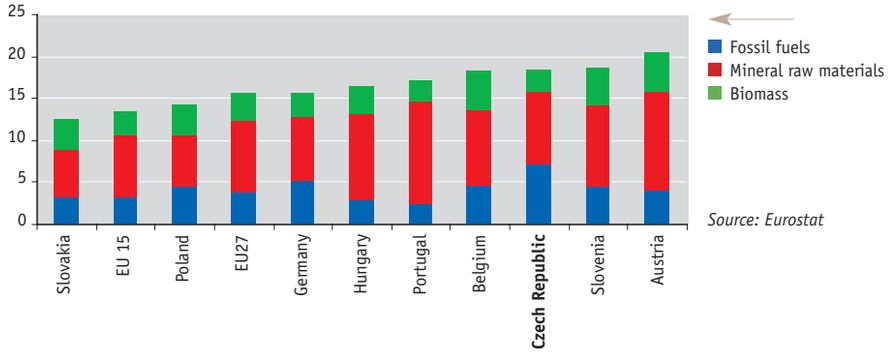
Chart 2 ➜ **Material consumption in the Czech Republic by material groups [%], 2007**



Source: The Environment Centre of the Charles University in Prague
The Czech Statistical Office

The "Other" category includes animal biomass intended for nutrition, other biomass and other fossil fuels and products.

Chart 3 ➜ **An international comparison of domestic material consumption by material group [tonnes per capita], 2005**



Source: Eurostat

Since 1990, **domestic material consumption (DMC)**[2] in the Czech Republic decreased from 300.4 million tonnes in 1990 to 200.9 million tonnes in 2007[3]. There was a decrease in the early 1990s. In 2002, DMC reached its historically lowest level (176.9 million tonnes), but it increased in subsequent years. Between 2002 and 2007, DMC increased by 13.6%. Over the last monitoring period – 2006 and 2007 – DMC increased by 1.5% year-to-year, i.e. less than between 2005 and 2006 (an increase of 3.3%). The trend over the past five years indicates that the decline in the overall environmental burden due to material consumption has halted in the Czech Republic, probably due to significant economic growth.

Between 1991 and 2007, the proportion of imports in DMC, i.e. the **material dependence on imports**, increased significantly from 10.5% in 1991 to 31.8% in 2007, while the increase between 2002 and 2007 was 4.8 percentage points. However, the last monitoring year showed a slight decrease of 0.3 percentage points. With regard to fossil fuels[4], the proportion of their imports in consumption increased from 15.7% in 1991 to 35.3% in 2007. This significant increase in fossil fuels was mainly due to the increased consumption of oil and natural gas, whose vast majority is imported. High foreign dependence that is associated with the supply of these fossil fuels is strategically unfavourable for the Czech Republic. In order to address this situation, the current possibilities for using potential domestic resources need to be assessed objectively, including a basic assessment of the economic conditions for the possible future opening of new deposits in the Czech Republic. These activities are addressed by the Department of Raw-Material and Energy Security of the Ministry of Industry and Trade in cooperation with the Raw Material Supply Experts Group, a working group set up by the Commission.

[3] *Since the Czech Republic's population is very stable, fluctuating around 10 million inhabitants, these levels correspond to approximately 30 tonnes per capita in 1990 and 20 tonnes per capita in 2006.*

[4] *The sum of the following categories: "Coal and coal products", "Oil and oil products", "Gas and gas products" and "Other fossil fuels and products"*

Mineral construction raw materials **make up the largest proportion within the DMC structure**. The absolute figures for this category indicate that it significantly contributed to the increase in DMC between 2002 and 2007. In this period, it increased by 39.3% from 59.1 million tonnes to 82.3 million tonnes. In 2007, there was a significant increase of 4.3 million tonnes (5.5%). The above increase is attributable to a significant growth in construction output in the Czech Republic. The second most important category within DMC is coal and coal products; its volume remained unchanged in 2002–2007, at approximately 56.8 million tonnes. Regarding natural gas and natural gas products, their consumption decreased from 7.1 million tonnes in 2002 to 5.9 million tonnes in 2007 (a decrease of 16.9%). This trend differs from the period before 2002, in which gas consumption increased as a result of the substitution of gaseous fuels for solid fuels. This positive trend – the consumption of gaseous fuels is generally associated with lower environmental impacts than the use of solid fuels – has therefore halted. The total consumption of fossil fuels stagnated between 2002 and 2007, which was reflected – among other things – by a stagnation in greenhouse gas emissions.

The proportion of renewable resources in DMC decreased from 16.8% in 2002 to 13.7% in 2006 and then increased to 14.4% in 2007. Given that the consumption of renewable resources is usually associated with less environmental impact than the consumption of non-renewable resources, the change in 2007 can be seen as positive.

The Czech Republic has the **third highest per-capita DMC** of all compared countries (Chart 3). With the exception of Slovenia and Austria, both the Visegrad countries and the EU15 have a lower DMC. The high DMC level in the Czech Republic is due to the highest per-capita fossil fuel consumption of all compared countries and the average raw material consumption. On the contrary, biomass consumption in the Czech Republic is the second lowest after Portugal. Fossil fuel consumption can be attributed to the high proportion of solid fuels in the primary energy base (51% in 2007, 47% in 2008) and the persistent relatively high energy intensity of the Czech economy.

Since material consumption largely depends on economic performance and the GDP, it can be assumed that, due to the financial crisis, the DMC indicator stagnated in 2008 and 2009. A similar pattern is likely to be observed in other European countries as well, so that – by international comparison – the Czech Republic's position is not expected to significantly change.

DATA SOURCES

- The Czech Statistical Office
- The Environment Centre of the Charles University in Prague
- Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1618)

The Environment Centre of the Charles University in Prague
http://cozp.cuni.cz

Eurostat, a set of sustainable development indicators
http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators/theme2

The UN, a set of sustainable development indicators
http://www.un.org/esa/dsd/dsd_aofw_ind/ind_csdindi.shtml

28/ Material intensity of GDP

KEY QUESTION ➜

Is the material intensity of GDP generation decreasing in the Czech Republic?

KEY MESSAGES ➜

😐 Between 1995 and 2007, there was a fairly significant decline in the material intensity of GDP, and a relative decoupling of the environmental impacts associated with material consumption from the economic performance curve.

☹ Between 2004 and 2007, the decline in material intensity was solely due to strong economic growth; material consumption also increased.

OVERALL ASSESSMENT ➜

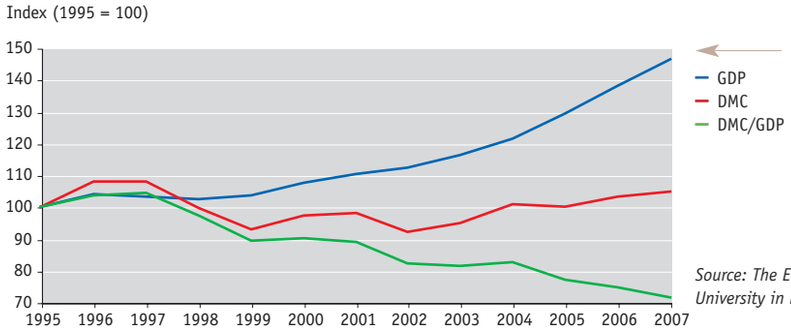
Change since 1990	😐
Change since 2000	😐
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

Thus far, no specific numerical targets have been set for the material intensity of GDP and the decoupling of the environmental impact curve and the economic performance curve. Documents such as the **State Environmental Policy of the Czech Republic**, the **Raw Material Policy** in the Field of Mineral Materials and Their Resources, the **State Energy Policy of the Czech Republic**, the Economic Growth Strategy of the Czech Republic and the **Sustainable Development Strategy of the Czech Republic** proclaim the need to efficiently use materials. At the international level, specific numerical targets have been adopted in Japan, Germany and Italy. The need to improve efficiency in transforming materials into economic output and to decouple the impact curve, i.e. in particular the environmental impacts, from the economic performance curve has been highlighted by the **EU Sustainable Development Strategy**, the **Thematic Strategy on the sustainable use of natural resources** and the **Recommendation of the OECD Council on material flows and resource productivity**. However, no international standards have yet been set for this area.

INDICATOR ASSESSMENT

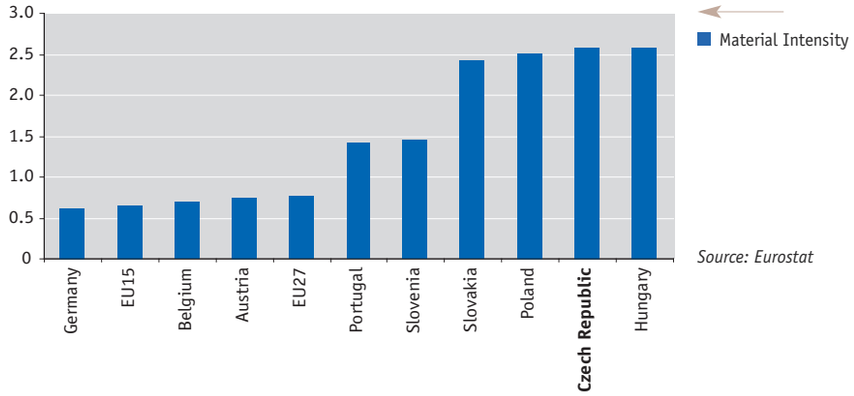
Chart 1 ➜ **The material intensity of GDP and the decoupling of the environmental impact curve from the economic performance curve in the Czech Republic [Index (1995 = 100)], 1995–2007**



Source: The Environment Centre of the Charles University in Prague, The Czech Statistical Office

Data for 2008 are not available yet.
DMC – Domestic Material Consumption

Chart 2 ➜ **An international comparison of material intensity [tonnes per thousand EUR], 2005**



Source: Eurostat

GDP at constant 2000 prices converted using exchange rates.

Over the entire 1995–2007 monitoring period, there was a relatively **sharp decline in the material intensity of GDP** (the green line in Chart 1). The decrease occurred in the 1997–1999, the 2000–2003 and the 2004–2007 periods. In the first two above periods, the decline was largely due to a decrease in the DMC indicator and only to a lesser degree due to economic growth. However, DMC increased between 2004 and 2007 and **the decrease in material intensity was** therefore **solely due to strong economic growth**. Decreasing material intensity is a positive trend that indicates an increased efficiency of the transformation of input material flows into economic output as a result of the introduction of modern technologies, an increased recycling rate and also a decreased environmental impact per unit of GDP.

Over the monitoring period (except for its early portion), the environmental impact curve expressed as material consumption (the red line in Chart 1) became increasingly decoupled from the economic performance curve expressed as GDP (the blue line). Over the entire period, there was only relative decoupling: both indicators increased, but GDP grew more rapidly than domestic material consumption. Absolute decoupling occurs when there is both GDP growth and an absolute decrease in domestic material consumption that indicates an absolute decrease in environmental impacts. A significant absolute decoupling occurred in 1998–1999 and 2001–2002. By contrast, there was no decoupling at all between 2003 and 2004 because domestic material consumption grew faster than GDP.

In comparison to both the EU15 and EU27, the Czech Republic's material intensity of the economy remains very high, similarly to other countries of the Visegrad Group. The unfavourable position of the new EU countries results from the fact that while their DMC per capita is comparable to the EU15 countries, their GDP per capita is several times lower. The low material intensity in Western European countries is also attributable to production being moved eastwards.

The situation appears a bit more favourable after GDP conversion using purchasing power parity that takes into account the price level in each country. Even so, the Czech Republic only reaches values comparable with the worst EU15 countries (Portugal, Slovenia), while in comparison to the EU15 average, its material intensity remains about twice as high.

In order to further **reduce material intensity** and to achieve an absolute decoupling of the curve of environmental impacts that are associated with material consumption from the economic performance curve, it is crucial to continue introducing advanced technologies that require fewer material inputs and produce less waste, to increase the rates of both recycling and economic restructuring towards a lower proportion of energy-intensive industries and a larger proportion of services or, in general, sectors with high added value.

Since material consumption largely depends on economic performance and the trend of the GDP indicator, it can be assumed that due to the financial crisis, the DMC indicator stagnated in 2008 and 2009. While it is very difficult to estimate whether the GDP

Waste and material flows

indicator will decrease more or less than DMC, material intensity can generally be expected to stagnate in the following years, as it did in 1999–2001 and 2002–2004.

DATA SOURCES

- ➜ The Czech Statistical Office
- ➜ The Environment Centre of the Charles University in Prague
- ➜ Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1620)

The Environment Centre of the Charles University in Prague
http://cozp.cuni.cz

Eurostat, a set of sustainable development indicators
http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators/theme2

The UN, a set of sustainable development indicators
http://www.un.org/esa/dsd/dsd_aofw_ind/ind_csdindi.shtml

29/ Total waste production

KEY QUESTION ➜

What progress has been made in reducing total waste production?

KEY MESSAGES ➜

Between 2002 and 2008, total waste production decreased by 14.1%. Over the same period, hazardous waste production decreased by 23%. In a European comparison of total waste production in 2006 recalculated per capita, the Czech Republic had the fifth lowest amount of production within the EU27.

Between 2007 and 2008, waste production showed a year-to-year increase of 6.4%. In 2007 and 2008, hazardous waste production increased by 8%. An increase in the total production of waste in 2008 projected also to a moderate increase in the total production of waste for the unit GDP.

OVERALL ASSESSMENT ➜

Change since 1990	N/A
Change since 2002	🙂
Last year-to-year change	😐

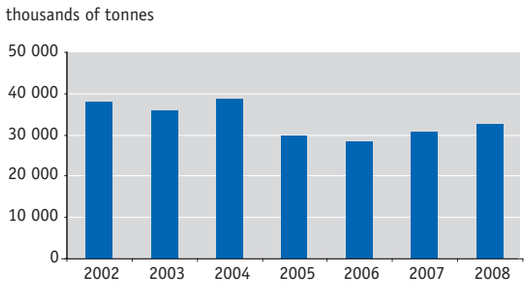
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The Waste Management Plan, which was adopted through Government Regulation No 197/2003 Coll., defines **reducing specific waste production** as one of the key strategic objectives, independent of the level of economic growth. The main measures to promote the strategic objective include:

- ➜ initiating and supporting, through all available means, changes in production procedures towards low-waste and no-waste technologies and, in cases of waste production, a higher level of recovery thereof;
- ➜ assuming that this is technically and economically feasible, replacing harmful materials and components used as raw materials with fewer harmful materials and components;
- ➜ minimizing the volume and weight of products while retaining their functional properties.

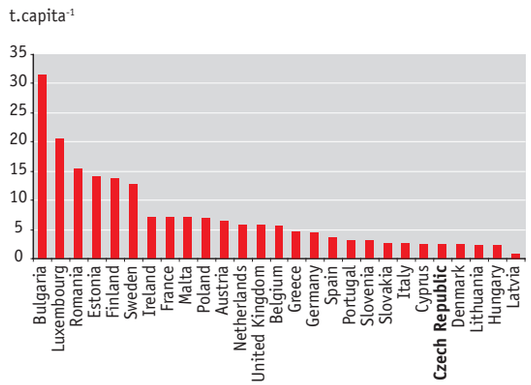
INDICATOR ASSESSMENT

Chart 1 ➜ **Total waste production in the Czech Republic [thousands of tonnes], 2002–2008**



Source: The Waste Management Information System

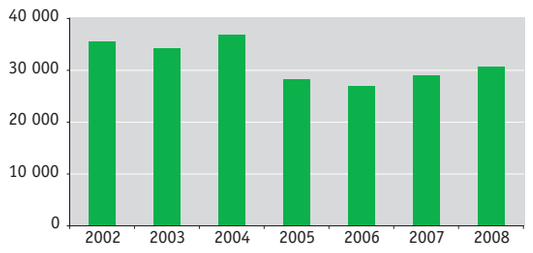
Chart 2 ➜ **Total waste production in individual EU countries per capita [t.capita^{-1}], 2006**



Source: Eurostat

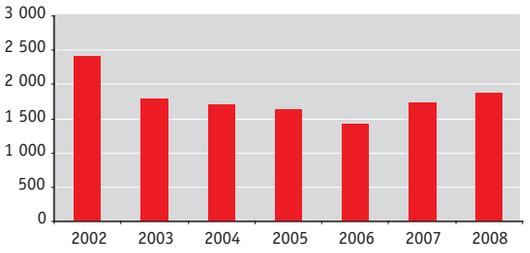
All 2008 data are only preliminary.

Chart 3 ➜ **Non-hazardous waste production in the Czech Republic [thousands of tonnes], 2002–2008**



Source: The Waste Management Information System

Chart 4 ➜ **Hazardous waste production in the Czech Republic [thousands of tonnes], 2002–2008**



Source: The Waste Management Information System

Compared to 2002, waste production (Chart 1) has shown a significant decrease. By 2008, total waste production decreased by 14.1% compared to 2002. Over the monitored period, the lowest value was recorded in 2006 when a total of 28.2 million tonnes of waste was produced. From 2006 total waste production moderately grew and between the years 2007 and 2008, reached a change between these years of 6.4%.
Production in non-hazardous waste group, which is the most significant with respect to volume, increased by 6%. In 2008, construction and demolition waste accounted for 56.6% of all waste production. The increase in total waste production in 2008 was also reflected as a slight increase in total waste production per GDP unit.

Compared to waste production per-capita in other **EU member states** (Chart 2), the Czech Republic had the 5th lowest total waste production per capita (2.4 t) in 2006.
In 2006, Bulgaria produced **the largest amount of waste** per capita of all EU member states, namely 31.4 t, while the smallest amount was produced by Latvia, namely 0.8 t. The EU27 averaged 7.27 t per capita.

Over the monitoring period, **the dynamics of non-hazardous waste production** were substantially lower compared to total waste production. This was largely because the 'other' waste category included the rather rigid trend in municipal waste production.
Between 2002 and 2008, **non-hazardous waste production decreased** (Chart 3) by a total of 13.5%. The lowest waste production in the 'other' category was recorded in 2006. Between 2007 and 2008, waste production in the 'other' category increased by 6.4% owing to the increased production of construction and demolition waste, which increased by 10.8%. In 2008, the proportion of 'other' waste in total waste production was 94.3%. The high proportion in total production is due to the consistently declining waste production in the 'hazardous' category, the advancement of technologies for eliminating the hazardous properties of produced waste and an overall change in industrial production.

Over the 2002–2008 monitoring period, hazardous waste production (Chart 4) saw a marked decline by 23% and that also through the increasing tendency in the last two years (a growth of 7% between the years 2007 and 2008). This trend was mainly influenced by the development of industrial technologies and technologies for waste treatment and processing. Economic influences were also significant – these included both the rising prices of primary raw materials and a system of fees that makes the disposal of waste in the 'hazardous' category expensive compared to waste in the 'other' category. Minimizing hazardous waste production is one of the Czech Republic's major obligations under the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and its Disposal.

Between 2002 and 2007, waste production in the 'hazardous' category decreased by 23%. In 2008, reported waste production in the 'hazardous' category increased by 7%.

DATA SOURCES

- ➜ The Waste Management Information System
- ➜ Eurostat, The Statistical Office of the European Union

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1610)

30/ Municipal waste production

KEY QUESTION ➜

Is the proportion of landfilled municipal waste decreasing?

KEY MESSAGES ➜

Between 2003 and 2008, the amount of sorted municipal waste components increased by 29%. The municipal waste production of 422 kg per capita per year is among the lowest in Europe.

In 2008, almost 80% of all municipal waste was landfilled. Landfilling thus remains the most common method in municipal waste management.

OVERALL ASSESSMENT ➜

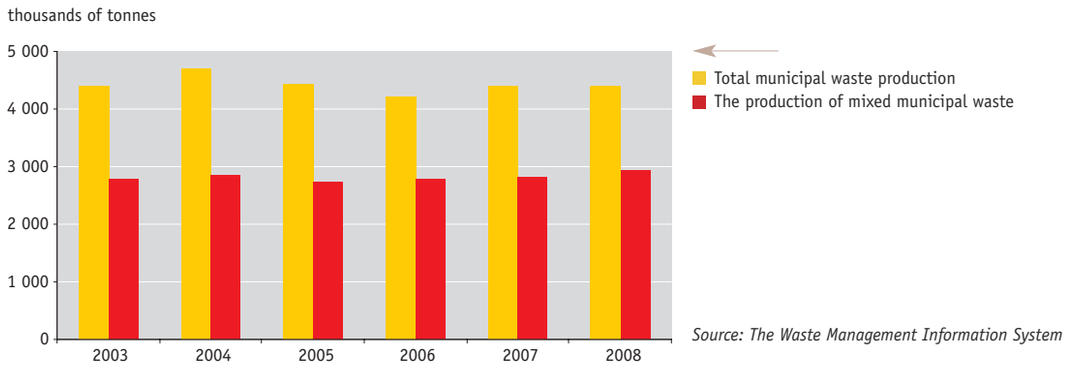
Change since 1990	N/A
Change since 2002	☺
Last year-to-year change	☹

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The Waste Management Plan, which was adopted through Government Regulation No 197/2003 Coll., defines the key strategic objectives that include reducing specific waste production independently of the level of economic growth; achieving the maximum recovery of waste as a substitute for primary natural resources; and minimizing the adverse effects on human health and the environment in waste management.

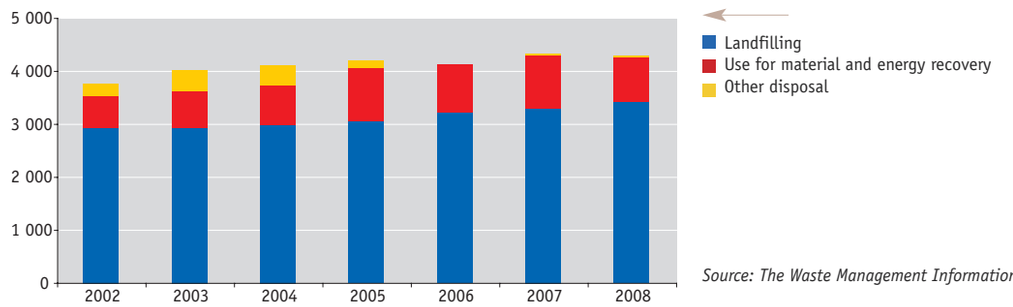
INDICATOR ASSESSMENT

Chart 1 ➜ **Municipal waste production in the Czech Republic [thousands of tonnes], 2003–2008**



Source: The Waste Management Information System

Chart 2 ➜ **The mix of municipal waste management in the Czech Republic [thousands of tonnes], 2002–2008**



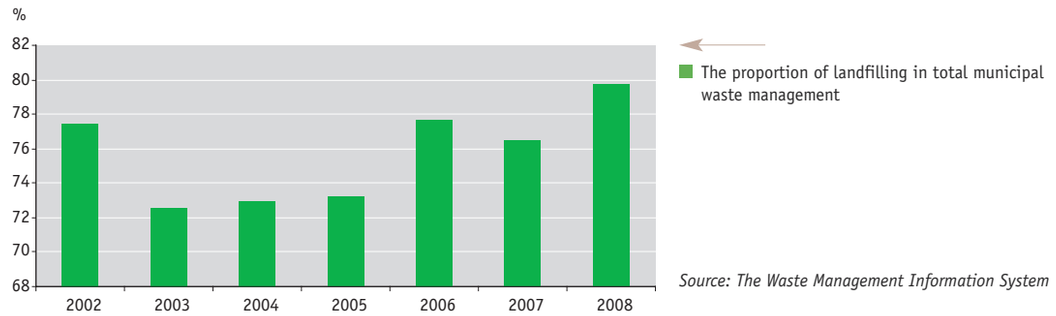
Source: The Waste Management Information System

Table 1 ➜ **Municipal waste management [t], 2002–2008**

	2002	2003	2004	2005	2006	2007	2008
Total management	3 773 497	4 030 044	4 107 661	4 198 407	4 148 708	4 334 477	4 296 898
Energy recovery	N/A	219 581	192 343	418 053	379 729	375 710	364 503
Material recovery	N/A	503 336	549 612	560 342	524 483	612 424	483 502
Landfilling	2 921 460	2 924 458	2 997 185	3 072 660	3 223 479	3 315 486	3 427 235
Material and energy recovery	612 160	722 917	741 955	978 395	904 212	988 134	848 006
Other disposal	239 877	382 669	368 521	147 352	21 017	30 857	21 657
Percentage landfilled [%]	77	73	73	73	78	76	80

Source: The Waste Management Information System

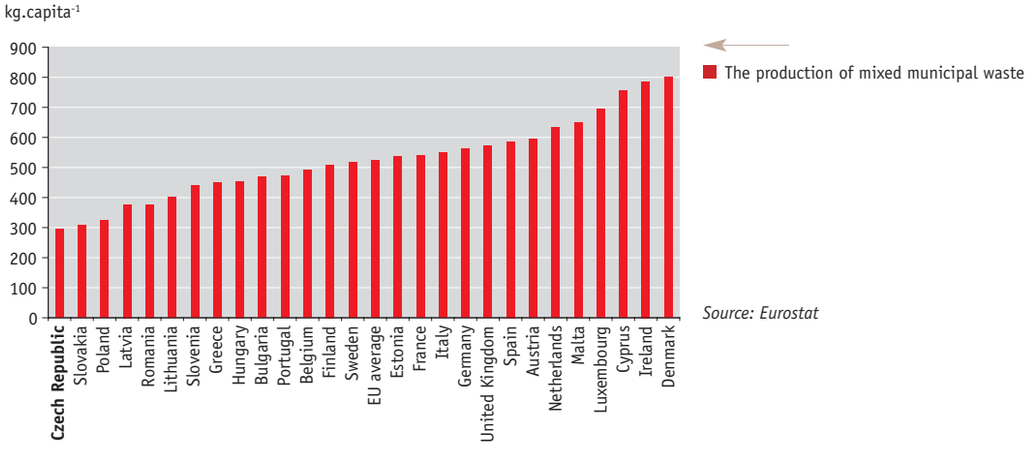
Chart 3 ➜ **The proportion of landfilling in municipal waste management [%], 2002–2008**



Source: The Waste Management Information System

All 2008 data are only preliminary.

Chart 4 ➜ **The production of mixed municipal waste in the EU [kg.capita^{-1}], 2007**



Source: Eurostat

Note to the Charts: The waste group entitled 'municipal waste' includes not only waste generated by the activities of individuals in the municipalities – residents, but also similar waste generated by the activities of individual entrepreneurs – sole traders and legal entities.

In 2008, total municipal waste production was 4 401 373 t and over the 2002–2008 monitoring period (Chart 1) there were only minimal fluctuations. In per-capita terms, there was about 422 kg of municipal waste per inhabitant of the Czech Republic.

The total production of residual unsorted waste that mostly originates from households and is classified in the 'mixed municipal waste' category also showed little fluctuation over the monitored period, remaining at approximately 2.9 million t. In per-capita terms, there was about 282 kg of mixed household waste per inhabitant of the Czech Republic.

In contrast to non-municipal waste management, the most common **management methods** are some of the disposal methods. In 2008, municipal waste disposal accounted for 80% of all management (Chart 2). Although the proportion of disposal has stagnated, mixed municipal waste (Chart 3) continues to be landfilled because of a lack of capacity for material and energy recovery. By contrast, the situation is quite different for sorted waste components (glass, plastics, paper), where most waste that is sorted by people is utilized.

In each member state, the issue of municipal waste is dealt with differently and even the definitions of household waste are different. In the Czech Republic, municipal waste is understood to include all waste generated by the activities of non-entrepreneurial individuals in municipalities.

Compared to other EU countries, the Czech Republic is doing very well and despite any possible differences in definitions, the production is very low (Chart 4). The situation in other countries of the former Eastern block is similar. Lower municipal waste production is therefore closely related to the population's purchasing power, consumer behaviour and the frequency of consumer goods replacement.

DATA SOURCES

➜ The Waste Management Information System

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1612)

31/ Waste management structure

KEY QUESTION ➜

Is the proportion of waste recovery increasing compared to waste disposal?

KEY MESSAGES ➜

Between 2002 and 2008, the proportion of waste recovery in total waste management increased by 4.3 percentage poins. However, there has been a slight decline since 2006 and that is to the benefit of pre-treated waste. Of the total amount of utilized waste, 96% is used for material recovery and 4% for energy recovery.

Over the long term, the proportion of disposed waste has declined. It currently equals nearly 19%. As in the past, the most frequent disposal method is landfilling (93%).

OVERALL ASSESSMENT ➜

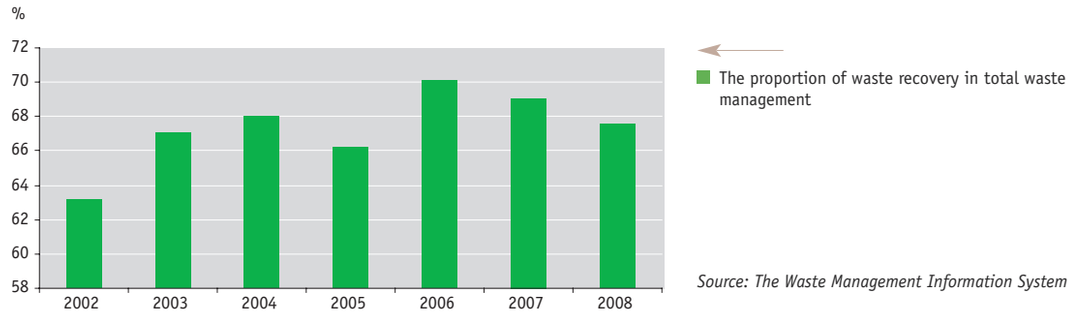
Change since 1990	N/A
Change since 2002	🙂
Last year-to-year change	😐

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The Waste Management Plan, which was adopted through Government Regulation No 197/2003 Coll., defines the maximum recovery of waste as a substitute for primary natural resources as one of the key strategic objectives.
The main measures to promote the strategic objective include:
- ➜ initiating and supporting, through all available means, changes in production procedures towards low-waste and no-waste technologies and, in the case of waste production, a higher level of recovery thereof;
- ➜ assuming that this is technically and economically feasible, replacing harmful materials and components used as raw materials with less harmful materials and components;
- ➜ minimizing the volume and the weight of products while retaining their functional properties.

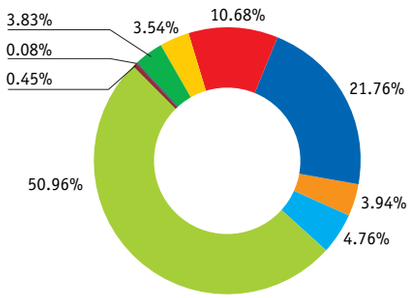
INDICATOR ASSESSMENT

Chart 1 ➜ **The proportion of waste recovery in total waste management in the Czech Republic [%], 2002–2008**



Source: The Waste Management Information System

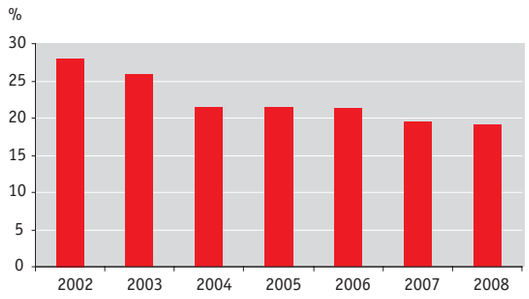
Chart 2 ➜ **The waste recovery structure in the Czech Republic [%], 2008**



Source: The Waste Management Information System

- R1 – Use of waste as a fuel and for energy recovery
- R3 – Recovery / regeneration of organic substances
- R4 – Recycling / recovery of metals
- R5 – Recycling / recovery of other inorganic materials
- R10 – Land treatment resulting in agriculture or ecological improvement
- R11 – The use of waste obtained under R1 to R10
- N1 – The use of waste for reclamation, landscaping etc.
- N2 – Transfer of sludge from waste water treatment plants for use on agricultural land
- Other uses of waste (R2, R6 to R9)

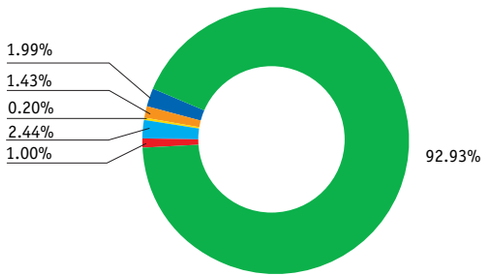
Chart 3 ➜ **The proportion of waste disposal in total waste management in the Czech Republic [%], 2002–2008**



Source: The Waste Management Information System

- The proportion of waste disposal in total waste management

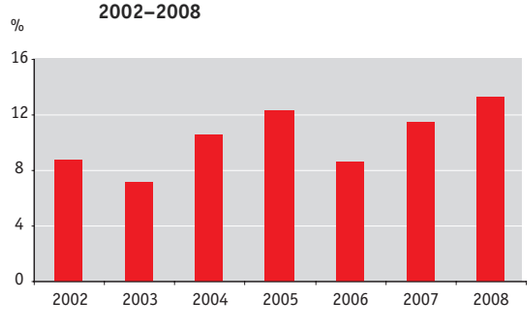
Chart 4 ➜ **The mix of waste disposal in the Czech Republic [%], 2008**



Source: The Waste Management Information System

- D1 – Depositing into or onto land (landfilling)
- D2 – Treatment through soil processes
- D4 – Surface impoundment
- D5 – Specially engineered landfilling
- D10 – Incineration on land
- D12 – Permanent storage

Chart 5 ➜ **The proportion of waste treatment in total waste management in the Czech Republic [%], 2002–2008**



Source: The Waste Management Information System

- The proportion of waste treatment in total waste management

All 2008 data are only preliminary.

Waste and material flows

Due to emerging technologies in the manufacturing sector and in waste management, **waste management** between 2002 and 2008 was headed towards a consistent increase in the proportion of waste recovery, especially in the area of material recovery, compared to disposal. In 2008, 67.5% of all produced waste was utilized.

Between 2002 and 2008, within the proportion of **recovery in total waste production** (Chart 1), management codes for waste recovery were reported for 63–72% of the reported cases of management. The proportion of waste recovery in total waste management increased by 4.3 percentage points between 2002 and 2008. However, there has been a slight decline since 2006. Assuming that waste treatment is the first stage in waste recovery, the trend can generally be seen as positive.

Regarding **waste** recovery (Chart 2), the following codes are reported for the largest amount of waste: N1 Use of waste for reclamation, landscaping etc., R5 – Recycling / recovery of other inorganic materials, and R4 Recycling / recovery of metals. Therefore, 96% of all waste that is reported as utilized is used for materials recovery. The remaining 4% of waste is used for energy recovery, as fuel and for energy production.

Between 2002 and 2008, the proportion of **waste disposal** in total waste management showed a consistent decline. The main reasons include increasing waste disposal costs, the gradual closure of landfills and the resultant higher transport costs. Another factor for the waste flows' departure from disposal are the rising prices of primary raw materials and the increasing efficiency of industrial enterprises that are seeking to reduce waste production and increase recovery as raw material back into the production process. Between 2002 and 2008, the proportion of waste disposal (Chart 3) in total waste management decreased by 8.8 percentage points.

The waste disposal sector is still dominated by **landfilling** (Chart 4). In 2008, landfilled waste accounted for 93% of the total amount of disposed waste. It turns out that landfilling is still the most affordable waste disposal method and, owing to the high density of landfills and the easy transport access to landfills. This will remain the main disposal method in the future, despite the fact that smaller regional landfills are gradually being filled up and the construction of new landfills is not supported by state funds.

The second most frequent waste disposal method is surface impoundment. It accounts for 2.4% of total waste disposal. Of the total amount of disposed waste, only 1.43% is disposed of through incineration.

The declining proportion of waste disposal is a very positive development which shows that even in the current situation, it is possible to continually improve technology and employ waste management methods other than disposal. These are process that are feasible and affordable, both economically and operationally, for selected types of waste. With further technological development and demands for increased production efficiency, it can be assumed that the proportion of disposal will continue to decline.

Waste treatment is an ever-faster growing sector within waste management. This trend is closely linked to the development of applications that require certain types of produced waste to be treated. Between 2002 and 2008, the proportion of waste treatment in total waste management (Chart 5) ranged from 7 to 13%. Between 2002 and 2008, the proportion of waste treatment increased by 4.5 percentige points.

The most frequently used forms of treatment include waste pre-treatment in sorting lines before other techniques are applied, physical-chemical treatment (in the Czech Republic, this usually means stabilization and solidification technologies) and biological treatment (most often as biodegradation technologies).

DATA SOURCES

➜ The Waste Management Information System

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators

http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1614)

32/ Packaging waste production and recycling

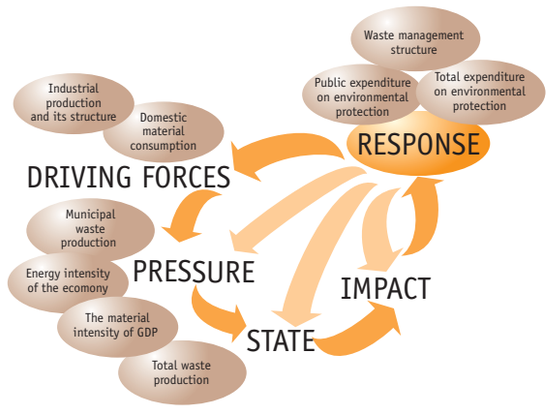
KEY QUESTION ➜

Is the amount of sorted packaging waste increasing? What is the recycling rate for sorted waste?

KEY MESSAGES ➜

The total yield of sorted waste collection is constantly increasing. In 2008, each Czech citizen sorted 53.1 kg. In 2000, this was only 12.4 kg. According to data from EKO-KOM, a.s., 70% of the population stated in a survey (that was conducted at the end of 2007) – that they consistently sorted waste.

Plastic waste accounts for 23% of the total amount of packaging that is put on the market. The recycling rate for plastic packaging is 56%.



OVERALL ASSESSMENT ➜

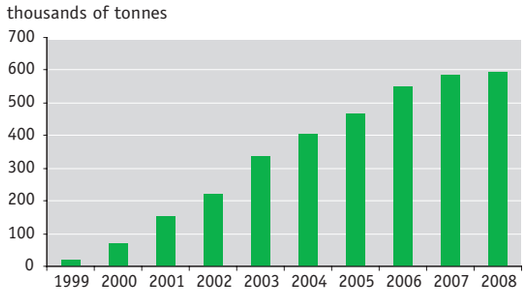
Change since 1990	N/A
Change since 2000	🙂
Last year-to-year change	🙂

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS ➜

The Waste Management Plan, which was adopted through Government Regulation No 197/2003 Coll., defines the key strategic objectives that include reducing specific waste production independently of the level of economic growth; achieving the maximum recovery of waste as a substitute for primary natural resources; and minimizing the adverse effects on human health and the environment in waste management.

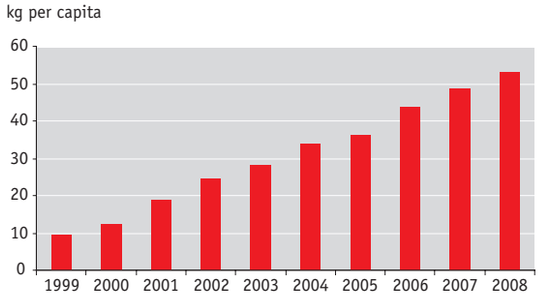
INDICATOR ASSESSMENT

Chart 1 ➜ **The total amount of recovered packaging waste in the Czech Republic [thousands of tonnes], 1999–2008**



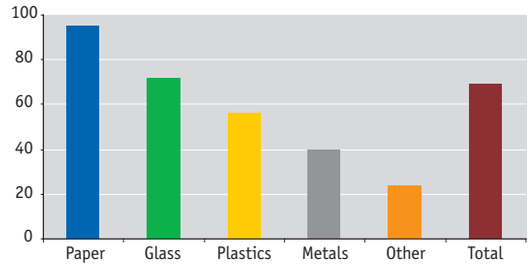
Source: EKO-KOM, a.s.

Chart 2 ➜ **The total yield of sorted waste collection in the Czech Republic [kg per capita], 1999–2008**



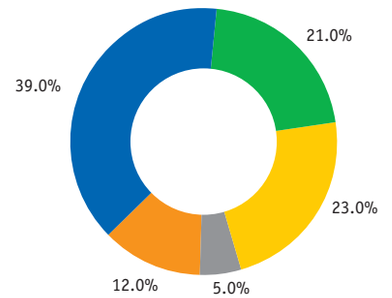
Source: EKO-KOM, a.s.

Chart 3 ➜ **The recycling and recovery rates of packaging waste in the Czech Republic [%], 2008**



Source: EKO-KOM, a.s.

Chart 4 ➜ **The mix of non-returnable packaging in the Czech Republic [%], 2008**



Source: EKO-KOM, a.s.

Packaging waste is a separate sector of waste management. With the rapid advent of retailing and the increasing range of goods that are packaged in non-returnable packaging, the issue of re-using waste from the packaging of used goods had to be addressed. In the early 1990s, drinks were packaged in returnable glass containers whose take-back and recycling was ensured through a system of deposits. The development of non-returnable plastic packaging and paper packaging gradually replaced returnable glass containers, and municipalities had to start addressing the issue of increasing quantities of mixed municipal waste that contained large amounts of plastic and paper waste. Along with the Act on Packaging, an authorized packaging company was set up, and collection containers for sorted waste (mostly glass, paper and plastics) began to appear in municipalities.

As the number of collection containers grew and the walking distance decreased, the total **amount of utilized packaging waste** started to significantly increase (Chart 1). Between 1999 and 2008, the total amount of utilized packaging waste increased almost 30-fold. In addition, the total yield of sorted waste collection (Chart 2) climbed sharply as well, showing an increase of 470% between 1999 and 2008. Each Czech citizen thus sorted 53.1 kg of waste.

In terms of the **recycling rate** (Chart 3), the most successful commodity is still paper, with a material recovery rate of 96%, followed by glass with a recycling rate of 72%, plastics 56% and metals 40%. The problem with recycling plastic waste is the large number of the types of plastic that are sorted by the citizens and put into collection containers. In addition, many of them have not retained their labelling, and it is therefore impossible to effectively process them.

If we look directly at the mix of the types of non-returnable waste (Chart 4), the most widely used material is still paper (39%), followed by plastics (23%). The proportion of glass in packaging is 21%.

DATA SOURCES

➜ EKO-KOM, a.s. – an authorized packaging company

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1616)

33/ Health risks from air pollution

KEY QUESTION

What progress has been made in mitigating health risks from air pollution?

KEY MESSAGES

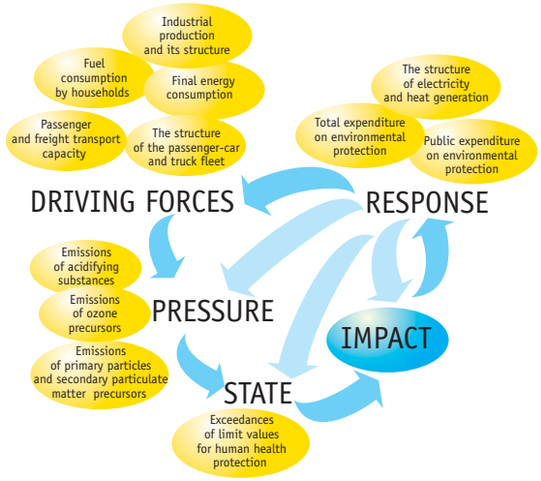
Polluted air is one of the factors causing the rise in allergies. Since 1995, the number of people who are treated for allergies has been increasing. While the increase was steeper in the 1990s, the trend in the early 21st century can be described as unstable.

Based on the average concentration of suspended particles of the PM_{10} size fraction that was measured in 2008 in the urban environment, it can be estimated that air pollution by this pollutant increased total mortality by 2%.

In 2008, the range of the probability estimate of an increased incidence of cancer due to BaP intake from ambient air ranged from nearly 2 people per 100 000 inhabitants to more than 8 people per 10 000 inhabitants, depending on the type of urban location.

Separating the direct effects of air pollution on human health from other co-acting factors and quantifying them is extremely difficult, if even possible.

Each year, depending on current air quality, a proportion of the population is exposed to concentrations of PM_{10} and PAH exceeding limit and target value, respectively.



OVERALL ASSESSMENT

Change since 1990	N/A
Change since 2000	
Last year-to-year change	

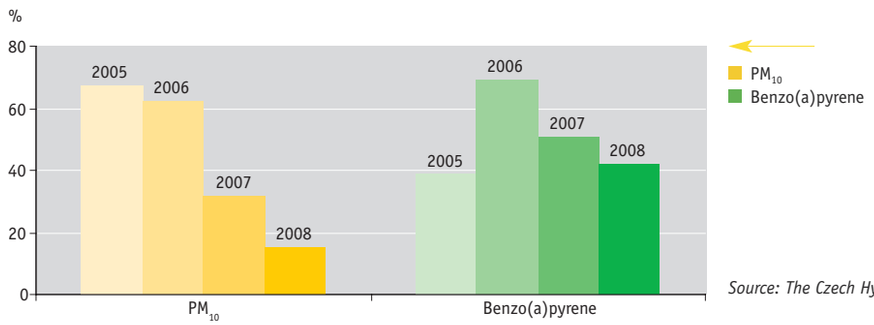
REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

The Sixth Environment Action Programme of the European Community called for the creation of a thematic strategy on air pollution aiming to attain "levels of air quality that do not give rise to significant negative impacts on, and risks to human health and the environment". Therefore, the **Thematic Strategy on Air Pollution** sets temporary objectives in the area of air pollution in the EU and proposes suitable measures for achieving them. It recommends modernizing the existing legislation, placing greater emphasis on the most harmful pollutants, and incorporating – to a larger extent – environmental interests into other policies and programmes.

Another important international document that addresses the issue of air pollution impacts on health is the **CLRTAP Convention**.

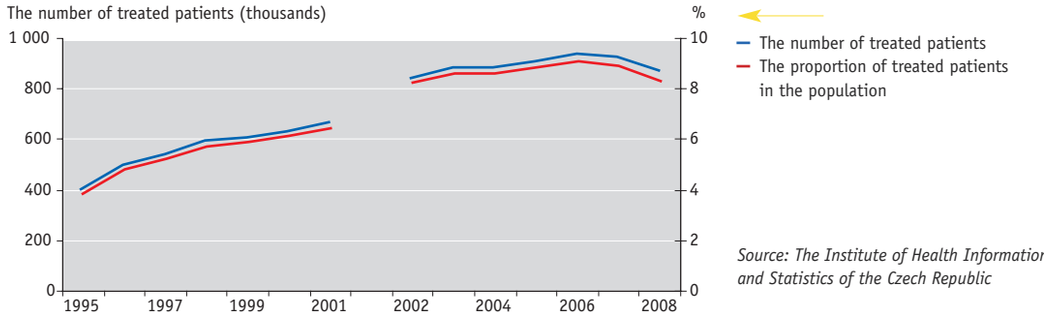
INDICATOR ASSESSMENT

Chart 1 → **The percentage of the Czech Republic's population that is exposed to concentrations exceeding the daily limit value for PM_{10} and the annual target value for benzo(a)pyrene [%], 2005–2008**



Source: The Czech Hydrometeorological Institute

Chart 2 → **The number of patients that are treated for allergic diseases in the Czech Republic [thousands, %], 1995–2008**



Source: The Institute of Health Information and Statistics of the Czech Republic

The large increase between 2001 and 2002 was due to a change in methodology, i.e. the aggregate monitoring of the allergology and the clinical immunology fields.

The most significant pollutants in terms of health include suspended particles in air and nitrogen dioxide in heavy-traffic locations. At some locations (those burdened with heavy traffic, industry and household heating), PAH are also a problem. Each year, depending on current air quality, a proportion of the population is exposed to above-the-threshold concentrations of these substances (data for PM_{10} and PAH) (Chart 1).

Both outdoor and indoor air pollution is being associated, among numerous other factors (nutrition, lifestyle, immunity etc.), with an increase in **allergies**. Since 1995, the number of people that are treated for allergies has been increasing. While the increase was steeper in the 1990s, the trend in the early 21st century can be described as unstable. The rather marked decline between 2007 and 2008 can be linked to the introduction of regulatory fees in the health-care sector (Chart 2). However, separating the direct effects of polluted air from other co-acting factors and quantifying them is extremely difficult, if even possible.

The following assessment is based on a report entitled „**The Health Effects of Polluted Air" by the National Institute of Public Health**. The action of nitrogen dioxide is associated with an increase in cardiovascular and respiratory mortality, but it is difficult if not impossible to filter out the effects of other, simultaneously acting substances, especially particulates. In children, exposure to NO_2 results in an increased risk of respiratory disease due to impaired immunity and reduced lung function. The main effect of NO_2 is increased airway responsiveness. The values of observed annual averages show that especially in the Prague agglomeration, residents – both children and adults – can be expected to suffer from reduced lung function, increased incidence of respiratory disease, and asthmatic and allergic conditions.

No safe threshold concentration has been found for the action of particulates. A short-term elevation of the daily concentrations of **suspended particles of the PM_{10} size fraction** contributes to increased total morbidity and mortality, especially from heart and blood vessel disease, and the increased incidence of respiratory disease, infant mortality, coughing and distressed breathing, etc. A long-term elevation of the concentrations may result in a reduced life span, mainly due to a higher mortality from heart and blood vessel disease, especially in old and sick people, and probably also from lung cancer. These effects are also often reported for annual average concentrations below 30 $\mu g/m^3$. For chronic exposure to fine suspended particles of the $PM_{2.5}$ fraction, reduced life expectancy is already observed for annual average concentrations starting at 10 $\mu g/m^3$.

Based on the average concentration of suspended particles of the PM_{10} fraction that was measured in 2008 **in the urban** environment, it can be estimated that air pollution by this pollutant increased total mortality by 2% (in 2007, by 2.4%). Given the range of annual average concentrations at different types of locations[1], (these ranged from 15 $\mu g/m^3$ to 48.7 $\mu g/m^3$,) the percentage of early deaths due to air pollution by PM_{10} in total deaths ranges from 0.8% at urban locations that are not burdened by traffic to 8.6% at locations that are the most burdened by industry and traffic.

The impact of air pollution with respect to the chronic effects of substances with non-threshold carcinogenic effects can be estimated through health risk assessment. The output from the assessment of the risk of an increased probability of developing cancer confirms the long-term significance of exposure to PAH, one of which is BaP. It has been estimated that in the most

[1] *Within the System for Monitoring the Health Status of the Population in Relation to the Environment, urban stations are divided into those that are: not burdened by traffic, burdened by traffic, burdened by both traffic and industry, traffic hot spots and heavily burdened by industry.*

exposed types of urban locations, the risk increases by just below one case per thousand inhabitants. In 2008, the range of the probability estimate of an increased incidence of cancer due to BaP intake from ambient air in the Czech Republic ranged (depending on the type of urban location) from $1.74.10^{-5}$ to $8.14.10^{-4}$, i.e. a risk increase from nearly 2 people per 100 000 inhabitants to more than 8 people per 10 000 inhabitants[2].

The Sixth Environment Action Programme of the European Community called for the creation of the Thematic Strategy on Air Pollution aiming to attain „levels of air quality that do not give rise to significant negative impacts on, and risks to human health and the environment". In order to accomplish these objectives, SO_2 emissions will need to be reduced by 82 %, NO_x emissions by 60%, VOC by 51%, ammonia by 27% and primary $PM_{2.5}$ particles by 59% compared to 2000. A large portion of these emission reductions will be achieved through measures that have already been adopted and implemented by member states. It is estimated that the above reductions could protect approximately 1.71 million life years from exposure to particulates and reduce acute mortality from exposure to ozone by 2 200 cases compared to 2000. On the basis of technical feasibility, it envisages that the concentration of $PM_{2.5}$ will be reduced by 75% and ground-level ozone by 60% by 2020.

DATA SOURCES

- The National Institute of Public Health
- The Czech Hydrometeorological Institute
- The Institute of Health Information and Statistics of the Czech Republic

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1662)

The incidence of asthma and allergies in children
http://www.szu.cz/tema/zivotni-prostredi/vyskyt-astmatu-a-alergii-u-deti-1

The System for Monitoring the Health Status of the Population in Relation to the Environment, subsystem I. The health effects and the risks of air pollution
http://www.szu.cz/uploads/documents/chzp/odborne_zpravy/OZ_08/ovzdusi_2008_zprava.pdf

The Thematic Strategy on Air Pollution
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0446:FIN:CS:PDF

[2] The assessment is made using an approach that considers a lifetime exposure 24 hours a day for an adult that weighs 70 kg and inhales 20 m^3 of air per day. The output of the assessment is a theoretical increase in the probability of cancer in individuals that may result from a given level of exposure to the substance in question in excess of the general incidence in the population over 70 years of lifetime exposure.

34/ Population's exposure to chemicals

KEY QUESTION

Is the population's exposure to selected chemicals decreasing?

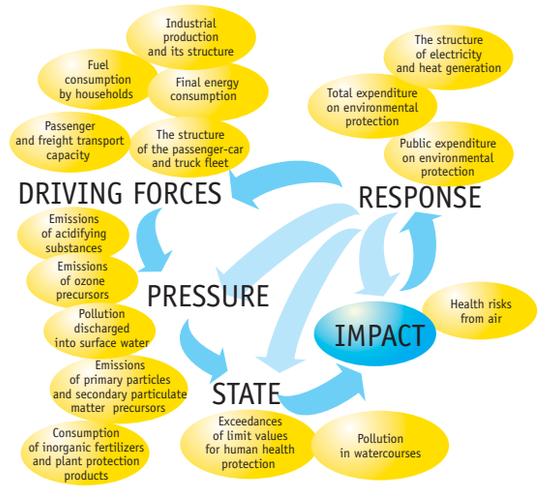
KEY MESSAGES

Since 2000, blood lead concentrations in the Czech Republic's adult and child populations have shown a downward trend. One of the key reasons is the ban on the use of leaded petrol.

Blood and urine mercury levels in the Czech Republic's adult and child populations do not exceed values that are associated with adverse health effects.

A significant long-term downward trend in the concentrations of DDT and other organochlorine pesticides (that were used from the 1950s to 1970s) has been evidenced in the breast milk of Czech mothers.

Since no safe blood lead level can be currently set for the child population, a further gradual reduction in environmental lead concentrations is a necessary precautionary measure.



OVERALL ASSESSMENT

Change since 1990	
Change since 2000	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

Priority area 3 „The Environment and the Quality of Life" within **the State Environmental Policy of the Czech Republic** aims to minimize the exposure of the human population to toxic metals and organic pollutants.

Health 21, a key programme for protecting and promoting public health that was adopted by the government in 2002, obligates individual ministries to take measures to promote one of its objectives, namely to reduce public exposure to health risks that are associated with water, air and soil pollution by microbial, chemical and other substances.

The Strategic Approach to International Chemical Management constitutes a political framework for the safe management of chemicals throughout their life cycle so that by 2020, chemicals will be produced and used in ways that lead to the minimization of significant adverse effects on human health and the environment.

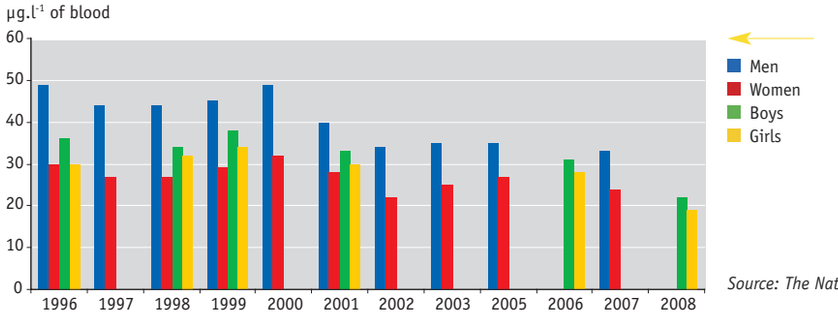
The Stockholm Convention on Persistent Organic Pollutants is a global environmental treaty aimed at protecting human health and the environment from the harmful impacts of persistent organic pollutants. At the national level, the implementation of the Stockholm Convention takes place according to the National Implementation Plan that was acknowledged by the Government on 7 December 2005 through Resolution No 1572.

The Protocol on Heavy Metals to **the Convention on Long Range Transboundary Air Pollution State** (CLRTAP) obligates the contracting parties to apply measures to reduce air emissions of heavy metals, especially cadmium, lead and mercury.

Reducing pollution by persistent organic pollutants is addressed by the Protocol on Persistent Organic Pollutants (POPs) **to CLRTAP**.

INDICATOR ASSESSMENT

Chart 1 ➜ **Blood lead levels in adults and children (aged 8–10) in the Czech Republic [µg.l^{-1} of blood], 1996–2008**

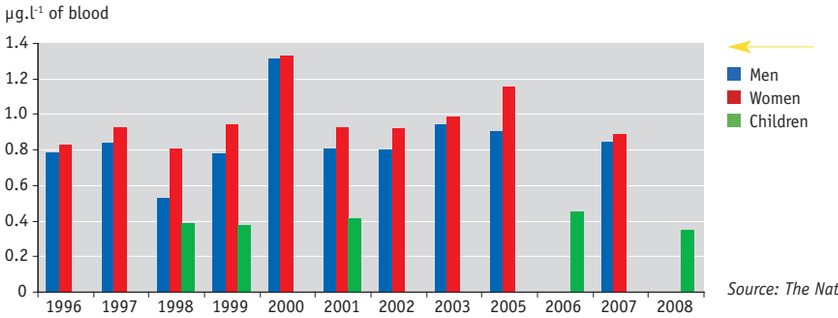


Source: The National Institute of Public Health

Data on adults (aged 18–59) – years: 1996 to 2003 – locations: Benešov, Plzeň, Ústí nad Labem, Žďár nad Sázavou, years: 2005 and 2007 – locations: Prague, Liberec, Ostrava, Zlín (Kroměříž and Uherské Hradiště)

Data on children (aged 8–10) – years: 1996 to 2001 – locations: Benešov, Plzeň, Ústí nad Labem, Žďár nad Sázavou, year: 2006 – locations: Prague, Liberec, Ostrava, Zlín (Kroměříž and Uherské Hradiště), year: 2008 – locations: Prague, Liberec, Ostrava

Chart 2 ➜ **Blood mercury levels in adults and children in the Czech Republic [µg.l^{-1} of blood], 1996–2008**



Source: The National Institute of Public Health

Data on adults (aged 18–59) – years: 1996 to 2003 – locations: Benešov, Plzeň, Ústí nad Labem, Žďár nad Sázavou, years: 2005 and 2007 – locations: Prague, Liberec, Ostrava, Zlín (Kroměříž and Uherské Hradiště)

Data on children (aged 8–10) – years: 1996 to 2001 – locations: Benešov, Plzeň, Ústí nad Labem, Žďár nad Sázavou, year: 2006 – locations: Prague, Liberec, Ostrava, Zlín (Kroměříž and Uherské Hradiště), year: 2008 – locations: Prague, Liberec, Ostrava

Lead is one of the best-known toxic heavy metals. At higher exposures, the health effects of lead include anaemia and adverse effects on the nervous system, kidney function and immunity. Blood lead levels are a reliable indicator of both current and recent exposure to environmental lead.

Blood lead levels in the adult population have gradually declined over the years. In the latest year of monitoring in adults (2007), mean (median) blood levels of 33 mg/l were found in men and of 24 mg/l in women, both of which are significantly lower compared to the levels that were recorded at the beginning of the monitoring in 1996 (Chart 1). In 2007, the maximum permissible blood lead level of 150 mg/l that had been set by the Commission on Human Biological Monitoring of the German Federal Environmental Agency (hereinafter the Commision) was exceeded in 0.4% of adults (1 case).

In 2008, the mean value (median) of recorded individual blood lead level values in the child population in individual monitoring cities ranged from 16 to 29 mg/l. The downward trend in blood lead levels in children, which had been observed since 2001, thus continued. To a certain degree, blood lead level data corresponded to the trend in the lead concentrations in urban air that were measured within the System for Monitoring the Health Status of the Czech Republic's Population in Relation to the Environment. Within the monitoring, the maximum permissible level of 100 mg/l that had been set by the Commission was not exceeded in any of the monitored children.

Blood mercury level

Of the possible sources of mercury exposure, the intake of toxic methylmercury from the consumption of fish and fish products is currently considered the most significant; the inhalation of vapours and the swallowing of small particles of mercury from amalgam dental fillings is less significant in terms of health.

Between 1996 and 2000, **blood mercury levels** in adults fluctuated, while an insignificant increase has been observed since 2001 (Chart 2) in accordance with the results of dietary exposure (i.e. a rise in seafood consumption). However, this exposure level is still permissible and does not indicate any significant health risk.

In 2007, the values stabilized. The degree I limit value for blood mercury level in adults of 5 mg/l that is significant with respect to health and that had been set by the Commission was exceeded in less than 1% of all persons (2 cases) in 2007. Risk groups include pregnant women and women of childbearing age (there is a risk of neurotoxicity to the foetus). In 2007, the limit value of 3.4 mg/l that had been set for women of childbearing age was exceeded in 3.5% of women within the monitored group.
Lead and mercury concentrations in the biological material of Czech adult and child populations are consistent with the typical values observed in other European countries.

PCBs and OCPs levels in breast milk

Polychlorinated biphenyls (PCBs) and DDT-, HCB- and HCH-type organochlorine pesticides (OCPs) are persistent organic pollutants (POPs). While the production of PCBs began in the 1920s, their industrial use spread mainly in the 1950s. Due to the wide use of these substances and their persistence, their concentration in the environment has increased, which is especially significant in the food chain. Producing PCBs was banned in the second half of the 1970s (in the Czech Republic in 1984) and their use became regulated. Since 1970, DDT-, HCB- and HCH-type organochlorine pesticides have not been used in the Czech Republic.

In the 1990s, **the level of OCPs** (that were used in the 1950s to 1970s) in breast milk continually declined. Since the turn of the millennium, the concentrations of total DDT have fluctuated between 300 and 400 mg/kg of fat. The decline in HCB levels has been continual. A downward trend in PCB levels has also been observed, although this decline has been changing to stagnation over the past few years. The decline that was noticeable in the last two years of monitoring (2007–2008) was tied to other monitoring areas and the nature of the trend cannot yet be estimated.

The main exposure pathway of a large portion of POPs is food and products of daily consumption. The health effects of POPs exposure include reproductive, nervous and immune system disorders, as well as carcinogenicity.

Repeated studies coordinated by the World Health Organization that have been monitoring the levels of selected POPs in breast milk in a number of European countries have shown that there are significant differences between countries. The level of dioxins in breast milk in a sample of Czech women was among the lowest. By contrast, the detected PCBs level was (along with Slovakia) high compared to other countries, which can to some extent be explained by a delay of about 10 years in banning PCBs production and use compared to Western countries.

The European Environment and Health Action Plan that is being implemented for the 2004–2010 period considers biological monitoring a significant part of preventive activities. The EU seeks to harmonize biological monitoring procedures in EU countries so that the outcomes are comparable, representative and focused on current issues. The EU 7th Framework Programme will support scientific and technical programmes.

The efforts to **restrict the movement** of persistent pollutants in the environment are also linked to the implementation of the EU's new chemicals policy called REACH[1], which represents a new system of chemical management that ensures that – no later than 2020 – only chemicals with known properties will be used and only in a way that does not damage the environment or human health.

DATA SOURCE

➜ The National Institute of Public Health

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1664)

Health and environmental indicators of the National Institute of Public Health
http://www.szu.cz/tema/zivotni-prostredi/chemicke-latky-a-fyzikalni-faktory

The System for Monitoring the Health Status of the Czech Republic's Population in Relation to the Environment
http://www.szu.cz/publikace/monitoring-zdravi-a-zivotniho-prostredi

[1] *Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency (ECHA), amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC („REACH").*

35/ Noise pollution

KEY QUESTION

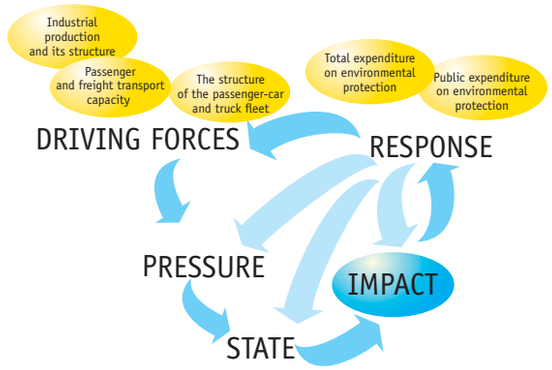
Is the Czech population exposed to excessive noise that adversely affects human health?

KEY MESSAGES

☹ In 2007, the preparation of strategic noise maps for road, rail and air transport and for agglomerations with more than 250 000 inhabitants showed that within the monitored areas of the Czech Republic, 245 385 people were exposed to above-the-threshold daily values and 314 396 people to nightly values.

Within Round I of strategic noise mapping, road transport was clearly identified as the principal source of noise.

Due to increasing road traffic, noise – as a factor that adversely affects human health – is becoming one of the main environmental problems.



OVERALL ASSESSMENT

Longer-term and year-to-year changes in the issue cannot currently be characterized. Only the first assessment is available; comparisons and trends will not be available until after 2012, i.e. after the completion of Round II of mapping.

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

Priority area 3 "The Environment and the Quality of Life" within the **State Environmental Policy of the Czech Republic** sets priority objective 3.3 entitled "Protection of the Environment and Humans against Noise". The partial targets and measures include Protecting quiet areas in the landscape and Reducing the burden on the population in settlements from exposure to transport noise and noise from industrial activities. Sanitary limits are laid down by Government Regulation No 148/2006 Coll., on health protection from the adverse effects of noise and vibrations. Limit values for strategic noise mapping in the Czech Republic are defined by Decree No 523/2006 Coll., on noise mapping.

INDICATOR ASSESSMENT

Table 1 ➜ **Limit values for noise indicators in the Czech Republic [dB]**

Noise source	L_{den} [dB]	L_n [dB]
Road transport	70	60
Rail transport	70	65
Air transport	60	50
Integrated facilities	50	40

L_{den} – The limit value (L_{den} for day-evening-night) that characterizes the overall annoyance over an entire day
L_n – The limit value for night hours (23:00–07:00, L_n for night) that characterizes sleep disturbances

Source: The Ostrava-based Institute of Public Health, the Ministry of Health

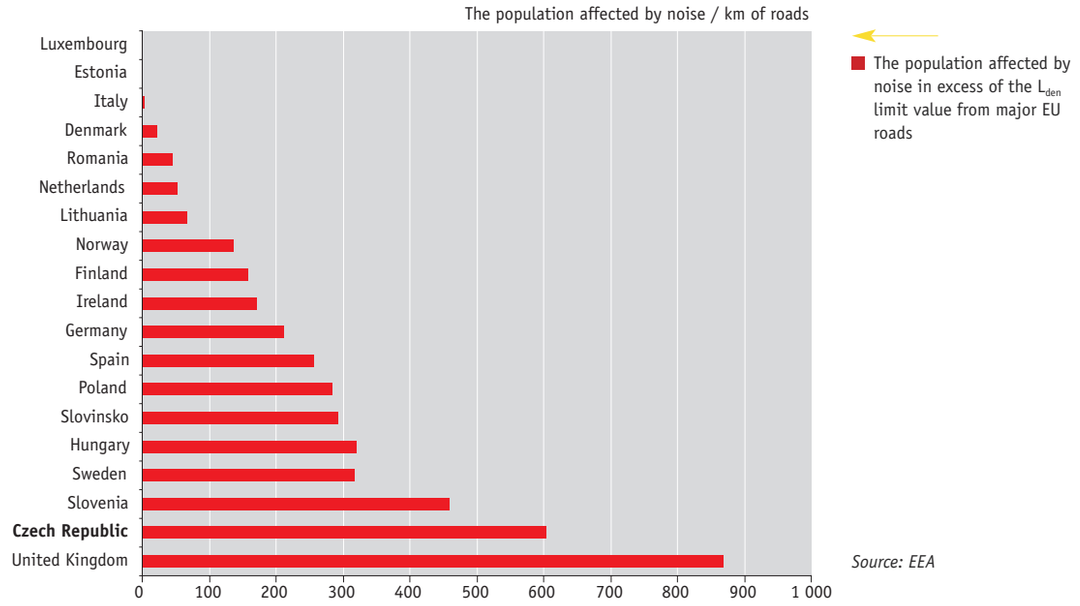
Table 2 ➜ **The Czech Republic's population affected by noise, 2007**

The number of exposed people and buildings				
L_{den} [dB]	Number			
	People	Residential buildings	Educational facilities	Hospitals
55–59	629 273	94 944	261	114
60–64	406 623	56 277	200	51
65–69	324 155	47 326	103	45
70–75	193 437	23 977	60	11
over 75	51 948	5 250	12	6
Total	**1 605 436**	**227 774**	**636**	**227**

The number of exposed people and buildings				
L_n [dB]	Number			
	People	Residential buildings	Educational facilities	Hospitals
45–49	780 127	128 027	377	152
50–54	512 267	73 177	189	73
55–59	381 070	53 690	126	38
60–64	236 612	33 681	81	29
65–69	66 757	7 759	20	6
over 70	11 027	1 050	3	1
Total	**1 987 860**	**297 384**	**796**	**299**

Source: The National Reference Laboratory

Chart 1 ➜ **The population affected by noise in excess of the L_{den} limit value from major EU roads, 2007 (preliminary results)**



Source: EEA

Noise came to the fore in the 1970s, when many people in Europe were diagnosed with noise-related conditions – the noise originated not only from transport, but also from other sources. The situation improved after the adoption of technical measures (insulation, noise barriers, etc.) **The issue of noise** was then pushed aside by other environmental problems. Given the increasing intensity of road transport, which has been clearly identified as the main source of noise, this human health-affecting factor can no longer be ignored.

The negative impacts of noise on humans lie in the effects of acoustic discomfort, impacts on human activities – for example speech, sleep, learning, etc., and impacts on organs, both auditory and extra-auditory. Annoyance along with sleep disturbance is also a source of stress, which is one of the factors that co-act in the development of 'civilization' diseases. Effects on the cardiovascular system are associated with long-term (lifetime) exposure to an equivalent acoustic pressure level L_{Aeq} greater than 65–70 dB, especially in terms of co-acting in the development of ischemic heart disease and hypertension. Negative effects of excessive noise on the central nervous and immune systems have also been described. In addition, the health impact of noise may increase when combined with other factors, such as air pollution. This problem can be particularly acute in cities and agglomerations.

In 2002, **Directive 2002/49/EC** of the European Parliament and of the Council related to the assessment and management of environmental noise (END) was adopted, which was implemented into Czech legislation in 2006. The directive's objectives include determining the exposure to environmental noise through noise mapping and by assessment methods common to the member states; ensuring that information on environmental noise and its effects is made available to the public; and the adoption of action plans by the member states, based upon noise-mapping results, with a view to prevent and reduce environmental noise.

In 2007, the preparation of Round I of strategic noise maps for road transport (for roads with a traffic volume greater than 6 million vehicles per year), rail transport (railway lines with a traffic volume greater than 60 000 trains per year), air transportation (for airports with more than 50 000 aircraft arrivals and departures per year) and agglomerations with more than 250 000 inhabitants was completed in the Czech Republic. The strategic noise maps were commissioned by the Ministry of Agriculture of the Czech Republic. The Czech Republic submits **the results of strategic noise mapping** to the Commission as part of its regular reporting requirements. Information about the number of people that are exposed to noise from various sources in the monitored areas is shown in Table 2.

On the basis of strategic noise maps that were created within Round I, the Ministry of Transport of the Czech Republic and regional authorities have prepared **Action Plans**. These plans include an assessment of the number of people exposed to noise, all noise abatement measures that have been approved or are being implemented, noise abatement measures whose implementation is planned for the next 5 years, a long-term strategy for protection against noise, and an economic assessment of costs, their effectiveness and benefits for residents. The Action Plans mainly included projects in transport infrastructure, where the main criterion was transport safety and efficiency. With a few exceptions, noise was not the primary criterion for the proposed measures. However, wherever there are changes in roads, the issues of noise and reducing residents' exposure have to be addressed.

In 2009, the EEA published a study on **the environmental impacts of transport**, including noise. This study presents its initial findings that follow from the strategic noise maps. According to the study, more than one-half of the population living in agglomerations with more than 250 000 inhabitants within the EU27 (67 million, i.e. 55%) are exposed to excess noise (more than 55 dB) from road transport. Fewer residents of these agglomerations, yet still a significant portion, are exposed to noise from rail and air transport (5.6 million and 3.2 million respectively). The first preliminary results of strategic noise mapping in Europe are shown in Chart 1.

In the period until 30 June 2012, round II of strategic noise mapping will take place, covering all agglomerations with more than 100 000 inhabitants, major roads with more than 3 million vehicles per year and major railways lines with more than 30 000 trains per year. Subsequently, action plans will be prepared for these areas as well.

In addition, an amendment to END and a unified strategic noise mapping methodology are being prepared. As part of the amendment, defining more specific requirements for the form and the content of action plans and implementing a uniform calculation methodology are being considered. It can be concluded that the objective of END (using assessment methods that are common to all member states) has not been accomplished and a uniform methodology needs to be established.

Noise abatement measures, as well as the start of work on round II of strategic noise mapping, are seriously threatened by the current economic crisis.

Health and the environment

DATA SOURCES

- The National Reference Laboratory for Noise Measurement and Assessment in Municipal Environment at the Pardubice-based Institute of Public Health
- The Ostrava-based Institute of Public Health
- The Ministry of Health of the Czech Republic
- The European Environment Agency (EEA)

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1666)

The National Reference Laboratory
http://www.nrl.cz

Strategic noise maps
http://geoportal.cenia.cz/mapmaker/cenia/portal

EEA, 2009: ***Transport at a crossroads. TERM 2008: indicators tracking transport and environment in the European Union. EEA Report No 3/2009*** [online]. Available from: http://www.eea.europa.eu/publications/transport-at-a-crossroads

Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 related to the assessment and management of environmental noise
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0049:CS:HTML

36/ Total environmental protection expenditure

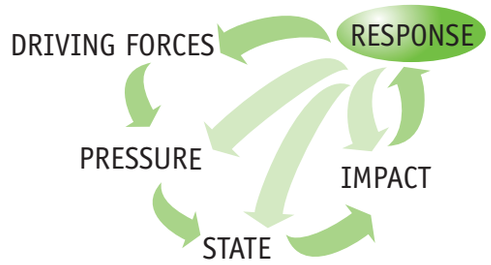
KEY QUESTION →

What is the amount of financial resources spent on environmental protection?

KEY MESSAGES →

Over the past five years, the total environmental protection expenditure has increased in the Czech Republic, mainly due to an increase in non-investment costs. In 2007, the expenditure totalled approximately CZK 70 billion and its proportion of the GDP was close to 2%. In 2008, it reached nearly CZK 72 billion, i.e. about 1.9% of GDP[1]. A substantial portion of the total expenditure (about 70%) were non-investment costs, the rest was investment in environmental protection. That amount ranks the Czech Republic among the leading EU countries. The largest portion of the total expenditure goes to waste management, wastewater management (especially in connection with the construction and modernization of waste water treatment plants and sewer systems), and air quality and climate protection. The total environmental protection expenditure corresponds to the priorities laid down by the State Environmental Policy.

Over the past five years, environmental protection investment have stagnated at approximately CZK 20 billion. Most investments went to end-of-pipe equipment (for removing existing pollution) instead of equipment in which an integrated approach to environmental protection is applied (including the use of environmentally friendly production technologies that prevent pollution from being generated).



The financing of environmental protection through investment and non-investment costs is a response (R) to the development and the state (S) of the environment thus far, namely of its individual components, aiming to maintain and improve the state. In addition, financial resources are spent on reducing the negative pressures (P) on the environment, which mainly arise from the activities of economic sectors, and by extension, on reducing the subsequent impacts on ecosystems and human health (I).

OVERALL ASSESSMENT INVESTMENT EXPENDITURE →	
Change since 1990	
Change since 2000	
Last year-to-year change	

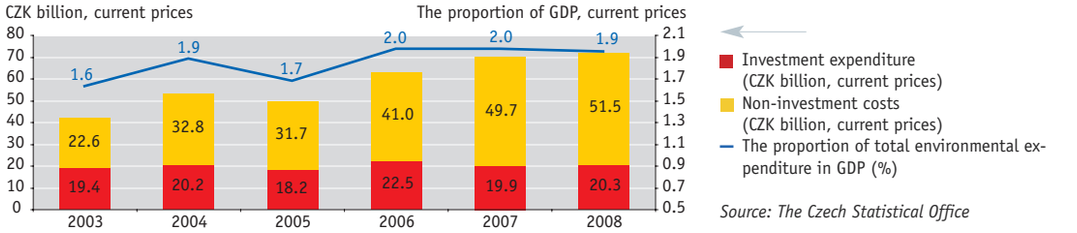
OVERALL ASSESSMENT NON-INVESTMENT COSTS →	
Change since 1990	N/A
Change since 2003	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS →

The objectives laid down by the **State Environmental Policy of the Czech Republic** concern the promotion of investments within the priority areas of environmental protection, but also within individual economic sectors – for example: the promotion of investment in the use of thermal energy from renewable sources in the sustainable use of natural resources priority area; the promotion of environmental investment in environmentally-sound machinery, air quality protection, waste water processing and treatment, waste processing and disposal, and the introduction of "cleaner" technologies in industry; the promotion of the reinvestment of financial resources obtained from tax collection and transport fees in the development and the application of modern environmentally-sound transport technologies, including the relevant infrastructure. The support for and the monitoring of environmental investments are also laid down by **the Sustainable Development Strategy of the Czech Republic**.

INDICATOR ASSESSMENT

Chart 1 → **Total environmental protection expenditure in the Czech Republic [CZK billion, % of GDP, current prices], 2003–2008**

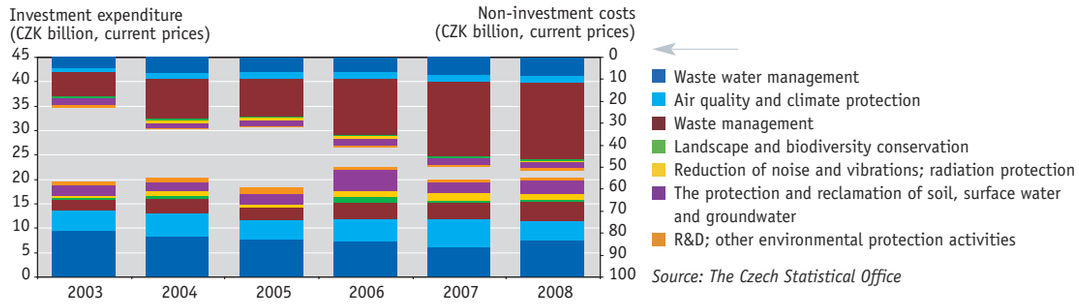


Source: The Czech Statistical Office

Investment expenditure relates to environmental protection activities whose main objective is – among other things – to control, reduce the volume of, and to prevent or eliminate pollutants and pollution, as well as other environmental damage, arising as a result of entrepreneurial activity.

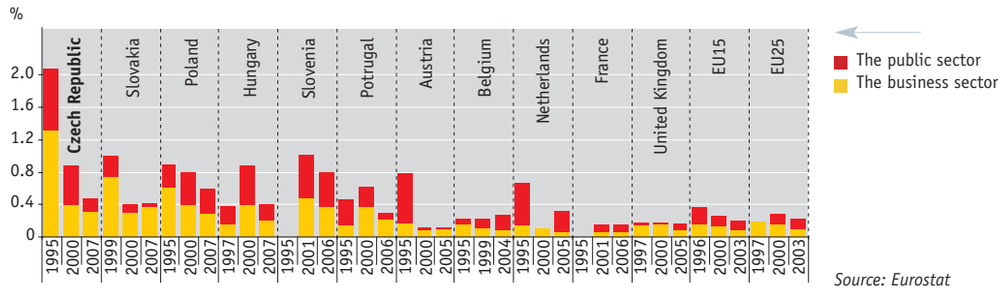
Non-investment costs (current or operating costs) – payroll costs, payments for material and energy consumption, repairs and maintenance, etc. and payments for services whose main purpose is preventing, reducing, treating or disposing of pollution and pollutants etc. that are generated by the production process of a given enterprise.

Chart 2 → **Investments and non-investment costs for environmental protection according to programming orientation in the Czech Republic [CZK billion, current prices], 2003–2008**



Source: The Czech Statistical Office

Chart 3 → **The proportion of environmental protection investment expenditure by the business and the public sectors in GDP, an international comparison [% of GDP], 1995, 2000, 2007 (i.e. the closest years available)**



Source: Eurostat

In the case of Slovenia, Netherlands, France and EU25, data for selected years were partly or fully unavailable.

Total environmental protection expenditure

The total statistically monitored environmental protection expenditure represents the sum of investment expenditure (investments) and non-investment (operating) costs[2]. In 2007, it totalled CZK 69.6 billion, which represents a year-to-year increase by nearly 10%. In 2008, total expenditure amounted to CZK 71.8 billion (Chart 1). Overall, this expenditure increased between 2003 and 2008, mainly thanks to the newly monitored non-investment costs, especially in waste management. Over the monitoring period, the proportion of total environmental protection expenditure in GDP slightly increased, or rather stagnated, fluctuating between 1.6 and 2%, while the proportion of investments as such was 0.6 to 0.8% of GDP (by contrast, more than 2% in 1995–1997).

In 2007 – in terms of **programming orientation** – the most funding was expended on waste management (CZK 37.1 billion), waste water management (CZK 14.1 billion) and air quality and climate protection (CZK 9.1 billion). In 2008, the distribution of funding was similar. For waste management, the proportion of expenditure on this area has been increasing over the past five years up to 55% of the total environmental protection expenditure, with more than 90% being non-investment costs.

Environmental protection investment

In 2007, **environmental protection investment** totalled close to CZK 20 billion (i.e. approximately 12% less than in 2006), thus confirming the stable trend of the past five years – the trend also continued in 2008, with investments totalling CZK 20.3 billion. In the above period, most investment went to end-of-pipe equipment (for removing pollution), and a smaller portion to equipment in which an integrated approach to environmental protection is applied (especially the use of environmentally-sound production technologies that prevent pollution generation as such).

In terms of **programming orientation**, most funding was invested in waste water management (CZK 6.1 billion), air quality and climate protection (CZK 5.9 billion) and waste management (CZK 3.4 billion) in 2007, similarly to preceding years. Compared to 2006, investment in the protection and reclamation of soil, surface water and groundwater showed the largest decrease (a decrease of CZK 2 billion), followed by waste water management (a decrease of CZK 1.3 billion). Conversely, investment in air quality and

[1] *Final data for 2008 were influenced by the following changes in the methodology of the Czech Statistical Office that took place in the same year:*
1.The OKEČ classification of enterprises was replaced with the new CZ-NACE classification.
2.Instead of entities with at least 20 employees under the old methodology, selected economic entities with at least 50 employees were included in statistical surveys. Therefore, the trend between 2007 and 2008 cannot be assessed in detail.

[2] *Non-investment (operating) costs have only been monitored since 2003 (at first for the business sector and, since 2006, also for the public sector).*

climate protection showed the largest increase (an increase of approximately CZK 1.3 billion). In 2008, most investment went to waste water management (CZK 7.6 billion), waste management (CZK 4.1 billion), and air quality and climate protection (CZK 3.8 billion), Chart 2.

As for the **economic sectors** of those enterprises that made the investments, since 2001, environmental investment has gradually shifted to the manufacturing, whose proportion of the investment increased to approximately 38% in 2007. It was followed by public administration, defence and social security, and electricity, water and gas production and distribution. However, in 2008, most environmental investment was made by electricity, water and gas production and distribution (24.7% of all investment), followed by the manufacturing (23.8%) and public administration, defence and social security (20.5%).

The **business sector** invests more in environmental protection than the public sector. In 2007, businesses invested more than CZK 14 billion and the public sector (both central and regional) approximately CZK 5.7 billion. The amounts that were invested by both sectors in 2008 remained nearly the same. This has confirmed the trend of the past five years, namely that more than 60% of all financial resources that are spent on environmental protection investment is invested by the business sector.

Non-investment environmental protection costs

In 2007, **non-investment environmental protection costs** reached CZK 49.7 billion (i.e. a year-to-year increase of 24%) and in 2008 approximately CZK 51.5 billion. Therefore, over the period in which they have been monitored, i.e. since 2003, these costs have accounted for a significant portion of the total expenditure on environmental protection (a proportion of more than 60% between 2003 and 2008). The largest amount of non-investment costs was spent on material and energy consumption and payroll.

By including the monitoring of non-investment environmental protection costs in the public sector (since 2006), these costs increased in 2006 (by 29%) and 2007 (by about 21%). However, the increase in non-investment costs in 2007 was also partly attributable to the business sector, probably due to increased material and energy prices.

In terms of **programming orientation**, most of these resources went to waste management (CZK 33.8 billion, a year-to-year increase of 33%), waste water management (CZK 8.1 billion, a year-to-year increase of 17%), and air quality and climate protection (CZK 3.2 billion, a year-to-year increase of 14%) in 2007, similarly to preceding years. In 2008, the distribution of the resources was similar – waste management (CZK 35.3 billion), waste water management (CZK 8.4 billion), and air quality and climate protection (CZK 3 billion), Chart 2.

As for the **sectors of economic activity**, the long-term largest portion of non-investment environmental protection costs have been spent within the manufacturing – roughly 40% in 2007 and about 41% in 2008. It is followed by businesses that deal with waste water and waste disposal, urban cleaning, and reclamation activities (a proportion of more than one quarter), public administration (about 15%) and the electricity, gas and heat production and distribution sector (about 11%).

Regarding investment, more resources are provided by the business sector. However, the gap between the business and the public sectors is considerably wider – in 2007, businesses contributed more than 80% (approximately CZK 41.8 billion) to environmental protection costs. In 2008, the situation in the proportions of both sectors was similar.

An international comparison

The Czech Republic, along with other post-communist countries, spent considerably more on environmental protection than the EU average (Chart 3). This was mainly due to the much worse condition of the environment that had to be addressed through increased investment, and the need to meet EU requirements in connection with EU accession (especially investment in water protection). Despite the above-average investment environmental protection expenditure, it needs to be said that the expenditure saw a sharp decline to a level that is considered insufficient by the OECD, because the condition of the Czech Republic's environment is still below the standards of OECD countries.

DATA SOURCES

- The Czech Statistical Office (CSO)
- The Ministry of the Environment of the Czech Republic

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND ADDITIONAL INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1543)

Indicators on Environmental Protection Expenditure, the Czech Statistical Office
http://www.czso.cz/csu/2008edicniplan.nsf/p/2009-08

37/ Public environmental protection expenditure

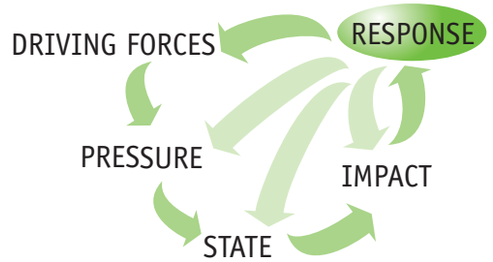
KEY QUESTION

What is the mix and the volume of expended financial resources from central sources and local budgets within public support for environmental protection?

KEY MESSAGES

Despite some fluctuations, public environmental protection expenditure in the Czech Republic has been increasing. This is mainly thanks to the involvement of EU funds in financing environmental protection activities in the Czech Republic. Also important is the growing role of local budgets, i.e. regions and municipalities, in financing environmental protection. In 2008, public environmental protection expenditure from local budgets totalled CZK 27 billion (ca 0.73% of GDP) and expenditure from central sources amounted to CZK 17.4 billion (ca 0.47% of GDP). Over the past five years, most support from public resources has been provided in the areas of water protection, waste management, and biodiversity and landscape protection. Public environmental protection expenditure thus corresponds to the priorities laid down by the State Environmental Policy.

The Czech Republic has successfully completed the process of developing both programmes for environmental protection and the direct transfer of financial resources from European funds to these programmes. While in the previous two years the resources were transferred to the state budget, in 2008 it was possible to transfer them directly to environmental protection programmes. The significant year-to-year reduction (of about CZK 6.4 billion) in the volume of public expenditure from the state budget in 2008 cannot be seen as negative, because the intermediary role in the use of European money transferred to the relevant funds.



The financing of environmental protection through investment and non-investment costs is a response (R) to the development and the state (S) of the environment thus far, namely of its individual components, aiming to maintain and improve the state. In addition, financial resources are spent on reducing the negative pressures (P) on the environment, which mainly arise from the activities of economic sectors, and by extension, on reducing the subsequent impacts on ecosystems and human health (I).

OVERALL ASSESSMENT

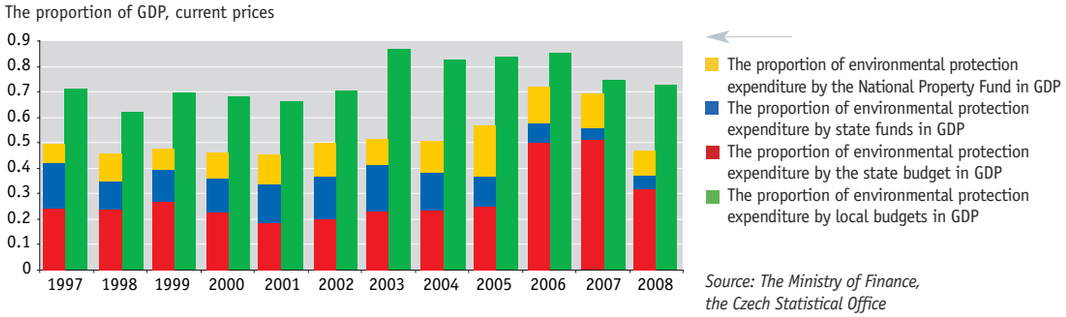
Change since 1990	
Change since 2000	
Last year-to-year change	

REFERENCES TO CURRENT CONCEPTUAL AND STRATEGIC DOCUMENTS

As part of its objectives and measures in the area of public environmental protection expenditure, the **State Environmental Policy of the Czech Republic** places special emphasis on expending resources from public budgets on priority areas while retaining economic effectiveness. It focuses attention on boosting environmental expenditure from the state budget and directing the subsidy policy from both the state budget and the State Environmental Fund of the Czech Republic primarily towards compliance with obligations that follow from negotiations with the EU and from the priority objectives of the State Environmental Policy of the Czech Republic. Furthermore, the State Environmental Policy of the Czech Republic states that it is necessary to ensure that provided assistance is in accordance with the EU rules for the protection of economic competition, that public-private partnerships are used, and that foreign financial resources (especially EU funds) are used effectively. The support for and the monitoring of public expenditure are also laid down by the **Sustainable Development Strategy of the Czech Republic**.

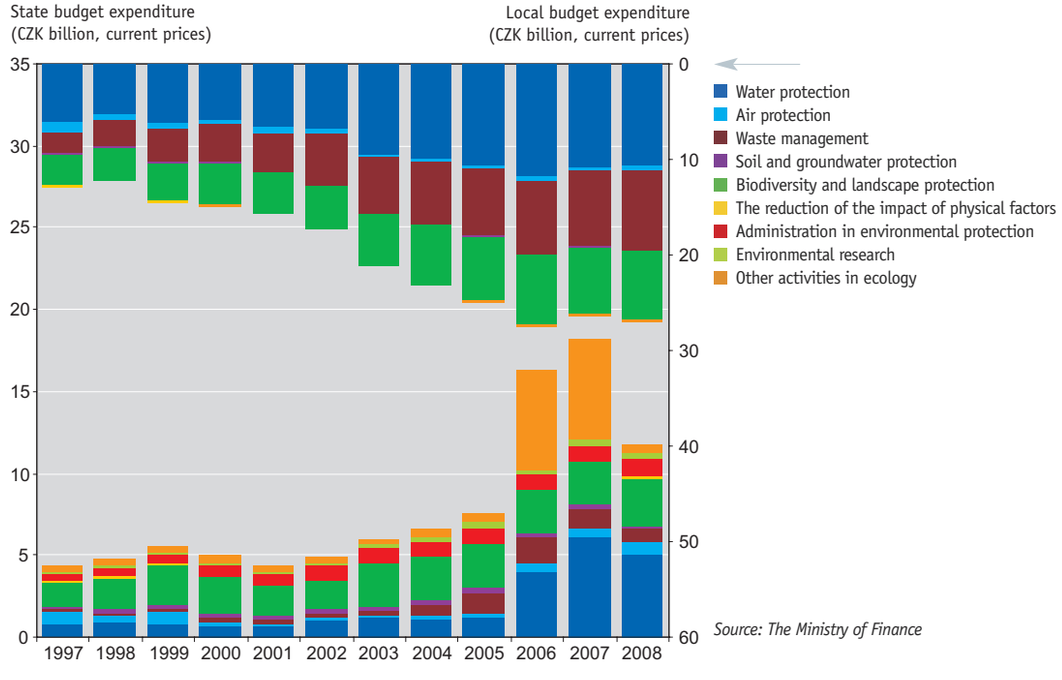
INDICATOR ASSESSMENT

Chart 1 **The proportion of public environmental protection expenditure in GDP in the Czech Republic according to source type [% of GDP, current prices], 1997–2008**



Source: The Ministry of Finance, the Czech Statistical Office

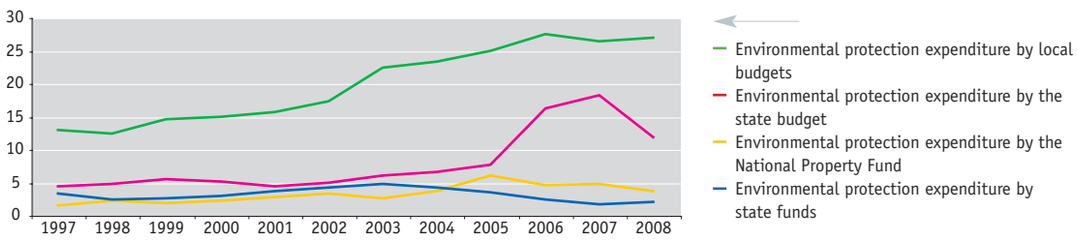
Chart 2 ➜ **Public environmental protection expenditure from the state budget and local budgets in the Czech Republic according to programming orientation [CZK billion, current prices], 1997–2008**



Source: The Ministry of Finance

A portion of public environmental expenditure by local budgets is a duplication of expenditure from central sources.

Chart 3 ➜ **Public environmental protection expenditure in the Czech Republic according to source type [CZK billion, current prices], 1997–2008**



A part of public environmental expenditure by local budgets is a duplication of expenditure from central sources.

Source: The Ministry of Finance

Public environmental protection expenditure is comprised of environmental protection expenditure from **central sources and local budgets** and it quantifies the implementation of the need to protect the environment at both the central and regional levels.

As regards public environmental protection expenditure in relation to the overall performance of the economy, **the proportion of the expenditure in GDP** between 1997 and 2008 was stable. Given the relatively strong economic growth, this is a positive finding – public support for environmental protection grew in proportion to economic growth and its importance was not lessened. In 2008, the proportion of public expenditure from central sources in GDP was 0.47%. In the case of local budgets, which expend more financial resources on environmental protection than the state budget, state funds and the National Property Fund, the proportion was 0.73% of GDP (Chart 1).

Public expenditure from central sources

In terms of the amount of financial resources, the most significant central source of public funding for environmental protection projects is **the state budget**, which provides subsidies, repayable financial assistance (interest-free loans), and guarantees for commercial loans. Between 1997 and 2008, expenditure from this source increased roughly 2.7 times (Chart 3). A significant increase in expenditure from the state budget was seen in 2006 and 2007, when financial resources from EU funds became involved in the budget chapters that are intended for financing environmental protection in the Czech Republic. In 2008, these resources were transferred directly to the newly prepared environmental protection programmes, which resulted in a year-to-year decline in expenditure from this source of 35% to CZK 11.8 billion. In terms of programming orientation, the areas that have received the most support over the long-term include water protection, biodiversity and landscape protection, and waste management (Chart 2).

Other public central sources of environmental protection expenditure include – as part of monitoring the expenditure from state funds – the **State Environmental Fund of the Czech Republic** and the now-defunct **National Property Fund** (whose remaining responsibilities and resources are now administered by the Ministry of Finance). In 2008, the expenditure by the State Environmental Fund of the Czech Republic amounted to approximately CZK 2 billion – however, it has declined over the past five years (by more than 50% compared to 2003), especially due to the decrease in income from laws pertaining to individual environmental components, i.e. depending on the improving condition of the environment, a delay in the drawing of resources from the Operational Programme Environment, and the allocation of most resources of the State Environmental Fund of the Czech Republic for co-financing EU programmes. Support from the State Environmental Fund of the Czech Republic in the form of loans, subsidies and partial payments of interest is directed mainly to the areas of water protection, biodiversity and landscape protection, air protection, and waste management. In 2008, CZK 3.6 billion was expended from the resources of the State Property Fund that are administered by the Ministry of Finance, namely in the form of contractual guarantees for the removal of old environmental damage (Chart 3).

Public expenditure from local budgets

Public sources of environmental protection expenditure also include **local budgets**. In 2008, public budgets amounted to approximately CZK 27 billion – they had increased more than twofold compared to 1997, when they had totalled approximately CZK 13 billion. Local budgets are thus the most significant public source of funding for environmental protection projects in the Czech Republic (Chart 3). At the municipality and self-governing region levels, expenditures are implemented continually based on the ability of municipalities and self-governing regions – however, they partly consist of subsidies from central sources. In 2008, most resources went to the areas of water protection (CZK 10.8 billion), waste management (CZK 8.5 billion), and biodiversity and landscape protection (CZK 7.1 billion), Chart 2. Mostly, this is support for projects of local importance – for example waste water collection and treatment, and measures relating to the appearance of municipalities and public green areas.

Financing by EU and foreign sources

Since 2004, both the EU and other foreign sources have also played an important role in financing environmental protection. The financial amount that was promised to the Czech Republic for the 2004–2013 period by EU and foreign sources is nearly EUR 5.7 billion and CHF 30 million. The main sources for financing environmental protection are the Operational Programme Infrastructure (2004–2006), the Cohesion Fund (2004–2010), the Norwegian and the EEA Financial Mechanisms (2004–2009), the Swiss-Czech Cooperation Programme (2007–2011) and the Operational Programme Environment (2007–2013) that is the largest in terms of subsidies and that is thematically linked to the OP Infrastructure.

DATA SOURCES

➜ The Ministry of Finance
➜ The Czech Statistical Office

LINKS TO A COMPREHENSIVE ASSESSMENT OF THE INDICATOR, THE METHODOLOGY AND FURTHER INFORMATION

CENIA, a list of key indicators
http://indikatory.cenia.cz (http://issar.cenia.cz/issar/page.php?id=1548)

List of abbreviations

AOT40	accumulated ozone exposure over a threshold of 40 parts per billion
AOX	adsorbable organically bound halogens
BaP	benzo(a)pyrene
BAT	Best Available Techniques
BOD_5	biochemical oxygen demand over five days
CENIA	The Czech Environmental Information Agency
CLC	CORINE Land Cover
CLRTAP	The Convention on Long-Range Transboundary Air Pollution
CNG	compressed natural gas
COD_{cr}	chemical oxygen demand by chromium
Coll.	The Czech collection of laws
DDT	dichlorodiphenyltrichloroethane
DMC	domestic material consumption
EAGGF	The European Agricultural Guidance and Guarantee Fund
EC	The European Commision
EEA	The European Environment Agency
EEC	The European Economic Community
EFMA	The European Fertilizer Manufactures Assotiation
EMEP	The Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
END	Environmental Noise Directive
EU	The European Union
EU ETS	The European Union Emission Trading System
FCOLI	thermo-tolerant (faecal) coliform bacteria
GDP	gross domestic product
GHG	greenhouse gases
HCB	hexachlorobenzene
HCH	hexachlorocyclohexane
HRDP	The Horizontal Rural Development Plan
IPR	Integrated Pollution Register
ISSaR	The Information System for Statistics and Reporting
IUCN	The International Union for the Conservation of Nature
LPG	liquefied petroleum gas
LV	limit value
LULUCF	Land Use, Land Use Change and Forestry
MT	margin of tolerance
NIS	National Inventory System
N/A	data not available
OCPs	organochlorine pesticides
OECD	The Organisation for Economic Co-operation and Development
PAH	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PEFC	Programme for the Endorsement of Forest Certification Schemes
PES	primary energy sources
PM	particulate matter
POPs	persistent organic pollutants
RDP	The Rural Development Programme
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RES	renewable energy sources
RMU	removal units
SEBI	Streamlining European Biodiversity Indicators
SEC	State Energy Concept
SEP CR	State Environmental Policy of the Czech Republic
TV	target value
UN	The United Nations
VAT	value added tax
VOC	volatile organic compounds
WMO	The World Meteorological Organization