



# **European Green Capital Award**

## **Application**

**City of Prague**

**Prague City Hall, Department of the Environment Protection**

**September 2008**

This document has been developed in accordance with requirements of the competition of the European Green Capital Award, that means in the structure and extent corresponding to the on-line application forms - see <http://www.europeangreencapital.eu>.

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## Introduction

Applying for the competition	2010
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### Municipality

Name of municipality	City of Prague CZ: Hlavní město Praha
Name of mayor	MUDr. Pavel Bém
Country	Czech Republic
Number of inhabitants in municipality	1 212 097 (1.1.2008)
Size of municipality (km <sup>2</sup> )	496.1

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*Cooperation (names of organizations in Czech):*

*Magistrát hl. m. Prahy – Odbor ochrany prostředí (odpovědný útvar), Odbor Kancelář ředitele magistrátu, Odbor dopravy, Odbor správy majetku, Odbor městského investora; Útvar rozvoje hl. m. Prahy*

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## 1. Local contribution to global climate change

### 1.1 Present situation and development, indicators

The issues of air emissions from sources of different categories on the territory of the City of Prague has been receiving continuous attention on a long-term basis. Since the beginning of the 1990s, in co-operation with other organizations (e.g. the Czech Hydrometeorological Institute, CHMI), the Air Pollution Sources Inventory (REZZO 1-4, large, medium-size and small stationary sources, transport) has been updated regularly. The main pollutants being monitored are solid particulates, SO<sub>2</sub>, NO<sub>x</sub>, CO, and NH<sub>3</sub>. The information is used for the atmosphere quality modelling, assessment of environmental impacts, planning of measures to reduce emissions, planning in the field of energy industry, transport, etc.

Calculations of greenhouse gas emissions with special regard to their impact on the climate started only recently, nevertheless the use of existing data makes it possible to assess even a longer period backwards. The emissions balance shown below, featuring CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from combustion processes in stationary sources on the territory of the Capital City of Prague, reveals that CH<sub>4</sub> and N<sub>2</sub>O emissions are relatively very small compared to that of CO<sub>2</sub>. Emissions from industrial processes (metallurgical and chemical productions, carbonate decomposition in the cement and lime production, and emissions from the use of F-gases), emissions from agriculture, from the landscape use and waste landfilling have not been monitored. Nevertheless, it can be assumed that those emissions, which have not been included in the calculations, are not too significant in the large city agglomeration. The calculations were made by CHMI, in accordance with the national greenhouse gas emission inventory.

**In 2006, specific greenhouse gas emissions in Prague from sources of all categories amounted to 7.85 t CO<sub>2</sub> equivalent per capita, of which emissions from natural gas totalled 1.71 t, from the electricity generation were 3 t, from the heat production were 1.07 t, and from transport were 1.34 t CO<sub>2</sub> equivalent per capita. Lower share was accounted for emissions from the solid fuel combustion on the City territory (0.71 t) and emissions from the liquid fuel combustion were negligible (0.03 t).**

In the past five years, the greenhouse gas emissions values have remained practically unchanged.

**The coefficient 598 g CO<sub>2</sub> / kWh was used for the calculation of emissions from the electricity generation in 2006.**

Detailed data on total and specific emissions since 1996 are shown in the following tables.

**Total greenhouse gases emissions on the territory of the Capital City of Prague (1000 t CO<sub>2</sub> equivalent)**

	1996	2000	2001	2002	2003	2004	2005	2006
Natural gas	2 596	2 057	2 233	2 138	2 211	2 154	2 116	2 031
Solid fuel	1 185	700	830	868	815	894	863	842
Liquid fuel	417	54	58	42	75	31	17	30
Emissions from the electricity generation	3 551	3 474	3 660	3 304	3 219	3 260	3 476	3 570
Emissions from the heat production	909	1 033	1 192	1 162	1 332	1 221	1 275	1 267
Transport	-	1 270	1 334	1 390	1 547	1 558	1 573	1 589
Total	8 659	8 603	9 344	8 975	9 258	9 249	9 561	9 628

**Specific greenhouse gases emissions on the territory of the Capital City of Prague (tonnes of CO<sub>2</sub> equivalent per capita)**

	1996	2000	2001	2002	2003	2004	2005	2006
Natural gas	2.15	1.74	1.93	1.84	1.90	1.84	1.79	1.71
Solid fuel	0.98	0.59	0.72	0.75	0.70	0.76	0.73	0.71
Liquid fuel	0.35	0.05	0.05	0.04	0.06	0.03	0.01	0.03
Emissions from electricity generation	2.95	2.94	3.15	2.84	2.76	2.78	2.94	3.00
Emissions from heat production	0.75	0.87	1.03	1.00	1.14	1.04	1.08	1.07
Transport	-	1.08	1.15	1.20	1.33	1.33	1.33	1.34
Total	7.19	7.27	8.02	7.66	7.89	7.79	7.89	7.85

**Average emissions from the electricity generation in the Czech Republic (g CO<sub>2</sub> / kWh)**

	1996	2000	2001	2002	2003	2004	2005	2006
Emission factor for the electricity generated in the CR	717	710	683	640	594	589	607	598

*Note concerning the calculation method:*

*The emissions from the electricity generation and heat production comprise only emissions from the production of those commodities released on the territory of the Czech Republic outside the Capital City of Prague. The generation and production on the territory of the City is included in fuel emissions.*

*Emissions from the electricity generation are calculated on the basis of the amount of electricity distributed in the Capital City of Prague and from average emissions from the generation of 1 GWh of electricity in the Czech Republic in the particular year. The production on the territory of the City has been deducted from the total amount of distributed energy.*

*Emissions from heat delivered from sources located outside of Prague were estimated on the basis of information on total heat delivery, estimated efficiency of the combustion source, distribution losses, and the fuel used.*

*The calculation of emissions from transport on the territory of the City is based on the principle of balancing the fuel consumption and transported volume in 23 different categories of vehicles classified by the type of transport, fuel used, and the level of the catalyst equipment. The following categories are included in emissions from transport in Prague:*

*individual road transport, public road transport and haulage, public city transport, and railway transport. Emissions from water and air transport are not included. Included were CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> emissions, which were converted into the CO<sub>2</sub> equivalent.*

*The calculations were made by the Czech Hydrometeorological Institute, Transport Research Centre.*

## **1.2 Implemented measures**

In the past (in the 1990s) measures to reduce emissions were aimed primarily at reducing of the solid fuel consumption. Furthermore attention has been focused on the transport pollution reduction. These issues are described in detail in Chapter 2. Local Transport and in Chapter 4. Quality of Ambient Air. In recent years, the City has been paying special attention to energy savings. This issue is described in the following text.

The Prague City Hall has been taking important measures to reduce climate change under various programmes, one of them is the Action Plan for the implementation of the Territorial Energy Concept of the Capital City of Prague for 2007-2010. This medium-term instrument has several priorities, all of which are concerned with measures to reduce the consumption of energy and its efficient use, and measures to raise the share of renewable energy sources in the total consumption on the City territory.

The main priorities are first of all as follows:

1. Supporting energy saving in buildings owned by the Prague City Hall, implementing of energy performance contracting (EPC) projects, introducing energy control systems, supporting stricter energy consumption requirements, etc.
2. Supporting efficient use of energy on the City territory, low-energy construction, increasing the efficiency of heating systems, raising the efficiency of heat deliveries from central heating sources, conversion of heating systems, energy savings and environmentally friendly processes in transport, etc.
3. Supporting the use of renewable and secondary energy sources, supporting the use of renewable energy sources in households and the public sector, supporting the construction of biogas stations, and using waste for incineration.

Thanks to its activities aimed at promoting the efficient use of energy and the use of renewable energy sources, in mid-2008 the Prague City Hall became a partner to the pan-European “Sustainable Energy Europe Campaign”.

### **Energy audits and implementation of measures**

In 2003-2004, in accordance with the requirements of the Act No. 406/2000 Code, nearly 2000 buildings owned by the Prague City Hall were audited for energy consumption. Approximately 725 of these audits comprised office and school buildings, social institutes, pensioners' homes, etc. The rest were audits carried out in apartment houses.

If implemented, the measures proposed in the energy audits, which would require investments to the total amount of CZK 4 497.7 million, could save more than 22% of the current energy consumption in buildings owned by the Prague City Hall, i.e. the saving of 175.8 million CZK/year in energy costs. The estimated amounts of potential savings differ considerably in different audits, varying between 7% and 70%. A summary of data on the implementation of measures proposed in the energy audits in the buildings owned by the Prague City under review (apartment houses are not included) is shown in the following table.

Annual fuel and energy consumption in 2004	2 119 000 GJ
Annual energy costs in 2004	713.85 million CZK
Number of implemented measures	343
Investments made (2005-2007)	1 450 million CZK
Annual energy savings	approx. 212 000 GJ
Annual operating cost saving	approx. 60 million CZK

So far most investments have been spent on school buildings. In majority of buildings heating systems were equipped with control system including the fitting with thermocontrol valves. The most investments were put into the heat insulation of structures.

The savings made as a result of the implemented investment measures account for approximately 10% of the total consumption. Owing to the considerable growth in energy prices, however, the cost savings are lower (approx. 8.5%).

### **Programme of Prague City Hall subsidies for the conversion of heating systems**

Another City instrument to reduce pollution, introduced in 1994, is the Programme of Prague City Hall subsidies for the conversion of heating systems and the use of renewable energy sources on the territory of the Capital City of Prague. Its objective is to motivate apartment owners and users to replace their original heating sources (mainly for solid fuel) with environmentally friendly heating media and to make wider use of renewable energy sources.

In the Programme first few years several thousand applications were filed each year and the amount of the subsidies paid was 50-100 million CZK a year. As a result of the large-scale installation of gas utility system in Prague, in the year 2000 the number of subsidies for the conversion from solid fuel heating began to decline. Therefore, in 2005 the Programme became oriented more widely on the support of renewable energy sources. As a result, the number of applications for subsidies is showing a rising trend again. As can be seen, the Programme continues to play an important role in the reduction of pollutant and greenhouse gas emissions.

Since 1994, nearly 40 000 apartments have been granted subsidies for the installation of ecologically friendly energy sources under the Programme, which cost the Prague City Hall CZK 412.3 million.

### **1.3 Objectives and planned measures**

The description of the planned measures is focused on the same areas as the previous section describing implemented measures (for transport see Chapters 2 and 4).

In the next few years, the implementation of energy saving measures proposed in the energy audits in accordance with the Action Plan of the Territorial Energy Concept of the Capital City of Prague, will continue. This will ensure the reduction of energy consumption in buildings owned by the Prague City Hall and Prague District Authorities.

The measures will be financed from the City budget and by subsidies made available by EU structural funds (Environment Operating Programme), possibly the Effect Programme announced by the Ministry of Industry and Trade of the Czech Republic. In the latter, half of this year and especially in 2009, the buildings of secondary, elementary, and nursery schools will be heat-insulated using subsidies from the Environment Operating Programme approved in the 1<sup>st</sup> and 3<sup>rd</sup> call. The total cost of projects the implementation of which will reduce the

energy demands of buildings owned by the Prague City Hall and the Prague District Authorities and will improve air quality in the City, will amount to CZK 925.8 million.

The aforementioned Programme of Prague City Hall subsidies for the conversion of heating systems and the use of renewable energy sources on the territory of the Capital City of Prague will remain in force.

#### **1.4 Documentation**

- National Information System on Greenhouse Gases (Czech Hydrometeorological Institute) (CHMI)
- Territorial Energy Concept of the Capital City of Prague (2005)
- Action Plan for the implementation of the Territorial Energy Concept of the Capital City of Prague in 2007 -2010 (2007)
- Energy audits of buildings and of energy management carried out between 2003 and 2005 (approx. 2000 buildings)
- Certificate of the Building Energy Demands – work started in 2007
- Final Report on the 1<sup>st</sup> and 2<sup>nd</sup> phases of the service related to the current implementation of energy saving measures proposed in energy audits, 2007-2008
- Integrated Regional Programme for Pollution Reduction and Air Quality Improvement on the Territory of the Prague Agglomeration (2006)
- Stage Reports on updates of Air Pollution Emissions Inventory (REZZO) in the Capital City of Prague
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)



## 2. Local transport

### 2.1 Present situation and development, indicators

The transport system of the Capital City of Prague is created by a radial ring road system of surface communications. The number of registered passenger cars per 1,000 inhabitants has been recently around 500. The distribution of transport volume between the public transport and automotive transport is 57:43. Prague has the best operating public transport in Central Europe, secured by the Prague Integrated Transport System. The backbone system is created by rail transport (the underground, tramways, railways), to which a network of bus lines is connected. The City Centre with a vast historical monument reserve requires a very efficient protection against infiltration of the automotive transport and that is why it is necessary to provide for good transport availability across the whole City by public transport means, by a network of park-and-ride parkings, by traffic regulation in the centre with help of paid parking stands, etc. Prague implements a number of measures targeted at decreasing the need and intensity of car use, increasing its safety, and reducing its negative impact on the environment (ambient air, noise). Besides the completion of the city ring roads construction and the development of the public transport, more attention is paid to the development of bicycle transport and pedestrian movement. The following text includes data for the requested indicators.

#### Bicycle transport

The building of and marking of bicycle routes in Prague is carried out in accordance with the Principles of the New System of Numerical marking of Bicycle Routes on the Territory of the Capital City of Prague of 2006 which followed to the Principles of the Further Development of the Basic system of Bicycle Routes on the Territory of the Capital City of Prague of 2003. Bicycle routes run on bicycle paths, on communications shared by the pedestrians and the cyclists or on the streets with low car use intensity.

Before the end of the year 2007 the total of 334 km of bicycle routes had been marked with direction marking. 126 km out of the whole network of bicycle routes were run on car-free communications shared by pedestrians and cyclists or on separate bicycle roads. **In 2007 0.27 km of bicycle routes were under operation per 1,000 inhabitants.**

Besides the official bicycle routes of the whole City importance, bicycle transport measures in the form of bicycle routes of local importance have been implemented. Furthermore, some sections in the City natural bio-corridors (for instance, along creeks) have been selected and promoted as suitable for recreational cycling.

#### Public transport availability

The analysis developed by the Technical Administration of Communications – the Section of Transport Engineering (the Czech corresponding acronym is TSK-ÚDI) concluded that **about 1,090 thousand inhabitants of the total 1,212 thousand inhabitants, i. e. 89,5 %, live within 300 meters distance from public transport services operated every hour or more often.**

The model of the current state of the network of the Prague Integrated Public Transport was used in order to set the criterion. The assessment included the underground stations, tramway

and bus stops, as well as the railway stations on the territory of the City with at least one public transport connection in an hour during the day (5 – 24 o'clock). The calculation was made separately for each of the 901 basic residential units. Besides taking into account the area coverage within the 300-metre distance from the stop or station, the factual layout of the residential area was considered as well.

### **Use of cars for travels up to 5 km long**

It can be estimated from the total number of 800 thousand travels made by Prague inhabitants on an average working day using a passenger car that **the share of travels up to 5 km long was approx. 20 – 25 % in the year of the survey.**

Conclusions of the survey of Prague inhabitants transport behaviour developed by the Transport Engineering Institute in 2005 were used for the calculation. The survey took place by means of direct questions in a questioning carried out by trained interviewers in apartments evenly distributed on the whole territory of the City. Almost 12 thousand responses from respondents over 6 years of age were assessed. Besides, at each of them a time snap of all travels taken over the 24 hours of a working day was taken. The value of the indicator was set implicitly from data on the travel time (up to 10 min.) and data on the sort of the transport means Used.

### **Low-emission public transport vehicles**

In the Prague Region the Prague Public Integrated Transport includes the underground, tramways, urban and suburban bus lines, railways, the Petřín Hill funicular, and ferries. The bus transport, important from the point of view of emissions generated on the territory of the City, is provided for by a joint stock company, the Prague Public Transport Co. a. s., and by other twelve private providers. The most important one is the limited liability company of Connex Prague s.r.o. that has been operating since 1<sup>st</sup> November 2008 as the limited liability company of Veolia Transport Prague s.r.o.

The abatement of emissions from the public city transport buses is a part of the Prague strategy on air pollution control (see Chapter 4). The operation of the public city transport buses does not represent a major source of emissions in Prague (their contribution is about 5% concerning NO<sub>x</sub> and 1% of PM<sub>10</sub> particulates). However, it represents indispensable potential for the air quality improving, particularly at certain localities (where the major traffic roads are connected to large housing estates, at road sections with steep gradient).

The bus fleet of the Prague Public Transport Co. (the Czech corresponding acronym is DP) as well as that of Veolia Transport Prague consists exclusively of diesel buses. 14 buses meet the EURO 4 standards (1%) out of about 1,200 buses belonging to the DP bus fleet. The EURO 4 standards or higher are applied when purchasing new vehicles within the regular bus fleet renewal. In the course of the following 6 years renewal of approx. 700 vehicles is planned, however, their purchase will depend on the funds allocated.

The bus fleet of Veolia Transport Prague (Connex Prague) consists of 163 buses. 11.5 % of the fleet are compliant with the EURO 4 or higher emission standard currently.. By the end of this year another 5 vehicles should be purchased (meeting the EURO 4 or EURO 5 standard). In the future approx. 8 – 10 % of new vehicles should be purchased every year.

**In summary it can be stated that the share of the public transport buses in Prague, that comply with the EURO 4 or higher standard, is approximately 2 %. This number will quickly grow when the bus fleet of the Prague transport operators is renewed (anticipated approx. 8 % yearly growth).**

As regards the support for introducing low-emission vehicles in the City, it is worth mentioning that with a subsidy provided by the City of Prague the Prague Services Co. is planning a purchase of five vehicles for the municipal waste collection this year that will be fuelled by compressed natural gas (CNG).

## **2.2 Implemented measures**

In the long term the public transport is systematically dealt with as described in the document Principles of the Transport Policy of the Capital City of Prague(1996). The implemented transport measures are focused on the modernising and building of the transport infrastructure, particularly the completion of the City main transport skeleton: the Inner City Ring Road that protects the historical city centre as well as the densely populated Prague residential areas and the Outer City Ring Road that will significantly lessen the City traffic load and will protect it against the transit and truck traffic. Above that, measures for the development and improving of the public city transport quality, of traffic telematics, of traffic control and increasing safety (speed measuring, camera systems, recording driving through red lights, etc.), of parking, of support for bicycle transport and pedestrian movement are implemented as well.

### **Budget**

About one third of the Prague municipal budget is allocated to the traffic yearly. In 2007 it was 33.1 % (CZK 20.3 billion of the total budget amounting to CZK 61.5 billion). A part of every-day expenditures is particularly the subsidy granted to the public city transport operation (80 %), and further the funding of road servicing and operating. Out of expenditures allocated to capital investments (CZK 9.7 billion) particularly development investments are paid, i. e. building of new roads, the underground and other transport facilities (60 %), other large scale repair work or reconstructions.

### **Building of transport constructions**

In the year 2007 partial stages of certain transport constructions were completed (Rohanské Embankment, Jinočanská Connection), important reconstructions took place (Štefánikův Bridge, Palackého Square crossroad) and the building of the C line underground extension, constructions on the Southern segment of the Prague Ring Road and the City Ring Road (the tunnels in Troja, the grade-separated crossings Malovanka, Špejchar, constructions in the Southern part of the City around Slivenec, Lahovice, Jesenice, including the bridge over the Vltava River) proceeded.

In 2007 the most important construction of the public city transport network was the underground extension of the C line in sections Ládví – Letňany (opened in spring 2008). In progress there were also vast tramway network reconstructions (Palackého Square and neighbouring sections, the route in Korunní Street, in direction to Karlovo Square, in Nusle, etc.).

### **Public City Transport**

The basic public city transport network is the underground that has three routes (54 stations, including three junctions). On the tramway network there are 26 daytime and 9 night-time lines operated. The bus transport is a complementary network on the territory of the City (it is more important in the outer City zone and its closest vicinity). The Prague Integrated

Transport System has been built since the beginning of the 1990s. The number of suburban bus lines has been increasing.

In 2007 the respective public city transport networks shared the overall transport of 3,970 thousand passengers on an average working day as follows: the underground 43.2 %, tramways 28.3 %, and buses 28.4 %.

**The development of selected public city transport parameters – on Prague territory, on an average working day**

Year	Length of the public city transport (km)			Traffic and transported volumes*	
	Underground	Tramways	Buses	Person-kilometres (mill.)	Transported persons (thousand)
1981	19.3	122.9	545.0	46.7	3 638
1990	38.5	130.5	607.3	57.6	4 189
1995	43.6	136.2	671.4	53.4	3 409
2000	49.8	136.4	812.4	56.0	3 290
2005	53.7	140.9	810.6	62.8	3 774
2007	54.7	140.9	820.2	63.0	3 970

In order to increase the public city transport attractiveness and for the purpose of simplifying the fare payment an option of purchasing a ticket via SMS was introduced in 2008. Currently a promotion campaign is running for a wider use of the multipurpose city chip card called “opencard” as a pre-paid period public city transport travel ticket.

**Regulation of the automotive transport**

Among implemented measures relating to regulation of the automotive transport in compliance with the approved Principles there are also the following ones:

- **Restricted entry zones:** Since the beginning of the 1960s trucks over 6 tonnes have gradually been restricted from entry to the City centre by means of a regulation. In 2003 and 2004 the restricted entry zone was expanded by Prague 4 and Prague 5. So far the latest expansion of the zone by the area of Spořilov came about in May 2006. Another regulation in the City centre is the restricted entry for trucks over 3.5 tonnes or more (combined with measures for the bus entry and parking). The combined zone covers almost the whole territory of the City District Prague 1 and some parts of City District Prague 2 territory. Since 2007 no entry permits to the zone have been issued for those buses or trucks that do not meet the EURO 2 standard.

- **Pedestrian zones and built-up areas** have been built in the City centre since the 1980s. One of the first pedestrian zones was in Celetná, Na Příkopě, and Na Můstku Streets, and later in Vodičkova Street. Between 2004 and 2005 new zones in the area of the Old Town (the Old Town Square and its vicinity, Karlova Street) and of the New Town (Republiky Square, vicinity of the Palace U Hybernů, Petřská Str.) were established with the aim of providing the pedestrians with more protected and attractive areas with a potential for rest.

- **Park-and-ride facilities:** The park-and-ride parkings provide an opportunity to combine a journey to the City centre by a passenger car with the Public Integrated Transport (PID). The City builds park-and-ride parkings with the aim to reduce parking right in the City centre and to decrease the automotive transport intensity in radial directions. At the moment 17 parkings of this type are operated with the overall capacity of approx. 3,000 vehicles.

- **Zones of paid parking stands:** In connection with the increasing number of motor vehicles on the territory of the Capital City of Prague a new type of organisation of the traffic control has been introduced since 1994. The first zone of paid parking stands was open in the City District Prague 1 (1996). In 2004 and 2005 a concept of their expansion was approved. In the period since autumn 2007 to spring 2008 other zones of paid parking stands on the territory of the City Districts Prague 2, Prague 3, and Prague 7 were open.

- **Public garages:** Particularly in the City centre the use of underground garages available for the public use has developed, e. g. in the Congress Centre, in the hotels and commercial buildings (2007: Palladium shopping mall). At present there are 17 such garages available.

### **Bicycle transport**

In 2003, following the concept from 1993 and the Land Use Plan measures from 1999, the Council of the Capital City of Prague approved the Concept of Further Development of the Basic Network of Bicycle Routes on the Territory of the Capital City of Prague. The new concept assumed a gradual implementation of approx. 450 km of bicycle routes across the whole City. In October 2006 the Prague City Council took into account the proposal for the New System of Numerical Marking of Bicycle Routes on the Territory of the Capital City of Prague that follows the concept and expands the planned network of bicycle routes across the City to approximately 670 km. There is the Commission of the Prague Council for Bicycle Transport dealing with the bicycle transport development in cooperation with the City organisations and respective City Districts.

By 2003 around 180 km of bicycle routes had been operated. In the following three years about 10 km of bicycle routes were built yearly. The year 2007 brought an increase in the building – almost 50 km of new bicycle routes were built and marked.

## **2.3 Objectives and planned measures**

There is a basic long-term conceptual document that sets objectives, priorities, and ways to find solutions of crucial issues of the City development for the period from 15 to 20 years, which is the **Strategic Plan of the Capital City of Prague** (developed by the Development Authority of the City of Prague, approved in 2000, its update is now being prepared). The Strategic Plan of the Capital City of Prague in its Chapter Transport and Technical Infrastructure declares: “Prague wishes to modernize, develop, and run the transport and technical infrastructure so that it supports the proper functioning of the City and its economy. It should also support the City ambitions and development as a whole. It should be on a par with the current technical advances and operate reliably, efficiently and be friendly to the environment.”

Strategic objectives for the field of transport:

- 1.1 An attractive integrated public transport system
  - 1.1.1 Prefer public transport in the traffic, fares, and investments
  - 1.1.2 Decisive role and importance of rail transport in the integrated system and strengthen interests in its use
- 1.2 Control and reduction of the car use
  - 1.2.1 Coherent and comprehensive main road network with priority given to the ring roads
  - 1.2.2 Reduced car traffic on the city streets with the reduction level becoming stricter the nearer to the City centre you get

- 1.2.3 Reduction of adverse environmental impacts cargo transport in the City
- 1.3 Integration into the European transport network
  - 1.3.1 Fast, comfortable and reliable connections and transfers on inter City and international links of passenger transport
  - 1.3.2 Completion of constructions and appropriate measures for the integration into the European networks
  - 1.3.3 Ensure a lasting harmony between the existence of airports in Prague and their capacity with local environmental restrictions in the vicinity thereof, along their access roads and air corridors.
- 1.4 Favourable conditions for pedestrians and cyclists
  - 1.4.1 Safe and comfortable pedestrian movement in the City
  - 1.4.2 Gradual improvement of the conditions for bicycle transport

Visions and objectives of the Strategic Plan for the current period are more in detail developed in the **Programme Declaration of the Council of the Capital City of Prague for 2006 – 2010** in the Chapter Modern and Environmentally Friendly Transport Infrastructure. The Council sets itself the objective to fulfil the vision of the City with modern, efficient, and reliably operated infrastructure, that is friendly both to people as well as to the environment.

Modern and working transport infrastructure is an essential prerequisite for improving the quality of living in Prague, for conserving the unique genius loci of the historical reserve as well as the economic prosperity of our City. The Council shall strive for accelerated completion of the backbone transport skeleton: the Inner City Ring Road that protects the historical City centre as well as the densely populated Prague residential areas and the Outer City Ring Road that will significantly lessen the City traffic load and will protect against transit traffic and cargo transport. The Council shall support connection of the internal city traffic to both the Czech and Trans-European transport networks. It will also support the reconstruction of the railway junction Prague and the modernisation of suburban railways.

From now on, the unambiguous priority of the Council shall be the support to the public city transport. The Council wishes to maintain its extremely high share of the overall transport volumes in the City and for that it will purposefully improve its quality and will expand the public city transport network, continue in the building of new underground routes, introduce new low-floor barrier-free tramways and further modernize the vehicle fleet of the Prague Public Transport Co.

When solving traffic issues the Council shall strive for adequate control of individual passenger car transport, including the introduction of a project of entry toll to the Prague Historical Reserve area as a crucial economic instrument for calming down the City historical centre. The Council shall create conditions that will enable participation of the private funds as well as much more important participation of government and EU funds in the public transport development projects as well.

The Programme Declaration has the intentions developed in detail until 2010 in sections (1) The City Transport Skeleton, (2) Public City Transport, (3) Control of Transport and Still Traffic, (4) Railway Transport on the Prague Territory and Suburban Rail Routes, (5) Bicycle Transport.

The measures are implemented in compliance with **the other conceptual documents** of the City as mentioned in the previous text: the Transport Policy Principles of the Capital City of Prague, the Principles of the Transport Telematics Development in the Capital City of Prague, the Concept of the Development of the Basic Network of Bicycle Routes on the Territory of the Capital City of Prague.

## 2.4 Documentation

- Transport Policy Principles of the Capital City of Prague (1996)
- Principles of the Transport Telematics Development in the Capital City of Prague (2002)
- Concept of the Development of the Basic Network of Bicycle Routes on the Territory of the Capital City of Prague (2003)
- Strategic Plan of the Capital City of Prague (2000)
- Programme Declaration of the Council of the Capital City of Prague for the period 2006 - 2013
- Yearbook – the Traffic in Prague 2007 (TSK – ÚDI)
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)
- Web site <http://cyklo.praha-mesto.cz> (information server Prague Cycling)
- Web site <http://doprava.praha-mesto.cz> (information server on transport in the Capital City of Prague)

### 3. Availability of green areas open to the public

#### 3.1 Present situation and development, indicators

Prague is situated in the broken terrain of the Vltava River valley in the geologically diverse environment. The territory of the City is to an important extent unique with numerous nature-close biotopes, places where human activities have not yet been too negative. The Prague nature and landscape are vital living spaces for a number of species of fauna and flora, including the protected species, and also provide the quality living environment for every-day life and leisure time activities of Prague inhabitants as well as its visitors or tourists, although not in the uniform manner over the whole territory. At the same time, city parks, historical gardens, forests, alleys, areas of special protection, natural parks as well as water courses create a unique colour of the City and contribute to its attractiveness and exceptional atmosphere.

On the territory of Prague there are 88 **areas of special protection** that account for more than 2,200 hectares (4% of the total City area). They create a wide spectrum of lands from geological localities through botanic, zoological, and entomological localities to the forest ones. Despite the complicated conditions of a large city, the nature conservation service strives to create systematically interconnected territorial units predominantly devoted to nature conservation, landscape protection, and recreation. The core of these areas are 11 **natural parks** that cover approx. 20 % of the total City area.

**The forest areas** on the Prague territory account currently for 4,890 ha, which is about 10 % of the total City area. In peripheral parts of Prague larger forest units are managed with natural composition of tree species and herbs.

The total area of gardens, parks and park areas owned by the City of Prague is more than 2,600 ha, of which almost 9 % are parks whose significance exceed the importance of the City boundaries – e. g. the Royal Game Preserve (Stromovka), the Letenské Orchards or the Kinských Garden. In Prague street alleys with about 26,000 trees can be found. Since 1995, when the Capital City launched the Project Prague for Trees – Trees for Prague under which the gradual renewal of street alleys took place, more than 2,500 new trees have been successfully planted in the City streets. **Water courses and reservoirs** are also important parts of the Prague landscape.

**As calculated by the Prague City Development Authority, the share of citizens who have public greenery areas available within 300 meters distance is 43.13%.**

It is the share of citizens that have the citywide system greenery areas, as recorded in the land use analytical background documents, available within the 5 minute walk, which approximately equals to the 300 m distance. The citywide system of greenery covers the selected greenery areas that are important with view to the urban concept, historical development, natural value, etc. These areas do not cover separation areas of greenery along traffic routes. The distance shall mean the shortest distance between the domicile and the greenery area taken along walking routes. For the citizens of the central districts the availability of the greenery in peripheral parts of the City is improved by a well developed system of the Public City Transport (including fast connection via the Underground).



### 3.2 Implemented measures

**The system of care for the greenery** in the Capital City of Prague that was developed on the basis of the concept of the Principles of the Care of the Public Greenery in the Capital City of Prague (1996) classifies parks and park-like treated areas into four categories according to their importance in the greenery system. The 1<sup>st</sup> category parks (the so-called parks of extraordinary importance) owned by the City are administered by the Prague City Hall. Parks of 2<sup>nd</sup> and 3<sup>rd</sup> categories and the so-called park-like treated areas (4<sup>th</sup> category) owned by the City have been put in trust with the City Districts Authorities on whose territories the parks are located.

The total area of the gardens and parks owned by the City is about 2,649 ha, of that: approx. 232 ha is of 1<sup>st</sup> category, approx. 71.4 ha is of 2<sup>nd</sup> category, approx. 188.1 ha is of 3<sup>rd</sup> category, and approx. 2,157.2 is of 4<sup>th</sup> category.

The Department of the Environment of the Prague City Hall (OOP MHMP) is authorised for the administration of the 1<sup>st</sup> category gardens and parks, and at the same time represents the Capital City of Prague as the owner of these lands. In this category there are:

- The Royal Game Preserve Stromovka,
- The premises of gardens atop the Petřín Hill (the Kinských Garden, the Garden Nebozízek, the Seminary Garden, the Rose Orchard, the Petřínské Orchards, the Strahovská Garden, the Lobkovická Garden)
- The Letenské Orchards,
- The park atop the Vítkov Mountain,
- The Hradčanské Square,
- The Vrtbovská Garden.

All the **forests** on the territory of the Capital City of Prague have been classified as the forests of special dedication as suburban forests and with increased recreational function (Section 8, Article 2 c of the Act No. 286/1995 Code on forests, in its valid wording). The forests are one of the most respected and protected greenery category within the land use plan development.

Over the last hundred years, the forests area on the Prague territory has grown by one third. Over the last 5 years the forest area has been successfully enlarged by 60 ha (by 1.5%). For example, in the years 2006 – 2008, the forest-park Vinice, 25 ha in area (on the territory of Prague – Běchovice and Prague – Dolní Počernice, in the Eastern part of the City) was planted. Currently, the forest stand covers approximately 10% of the total City area. The characteristic of the newly forested areas has been changing over the years together with changing reasons for forestation: from protecting the soil against erosion, through efforts to make the Prague surroundings more beautiful and making the citizens' rest in nature more comfortable, to the systematic plantation of the forest-parks as places for the short-term recreation of citizens of the newly developed housing estates.

The City of Prague, via its Department of the Environment of the Prague City Hall, provides for maintenance and management of 2,640 ha of forest land owned by the City. The forest management is regulated by the forest act and the Forest Management Plan (FMP) that is always developed for the period of 10 years. In January 2004, the new FMP for the period of 2004 – 2013 became valid.

The Prague City Budget allocated CZK 157 mil. in 2007 and CZK 97 mil. in 2008 for the management of the 1<sup>st</sup> category gardens and forests. The maintenance of parks and park-like treated areas (2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> category) is provided for by the respective City Districts. Annually about CZK 50 mil. is spent on the forest management on the City territory, while

another CZK 8 mil. a year is spent on the management of the protected areas. The management also includes information and educational activities, such as building of nature trails, issuing publications, etc.

### 3.3 Objectives and planned measures

Besides carrying on the activities stated in the previous section, other investments concerning the care for the greenery on the territory of the Capital City of Prague, are planned, in accordance with the Strategic Plan of the Capital City of Prague, the Land Use Plan of the Capital City of Prague, and other partial conceptual documents, such as the Forecast, Concept, and Strategy of the Nature Conservation and Landscape Protection in Prague, the already mentioned Forest Management Plan, etc. A new Concept of the Care for Greenery is being developed, too, which will also cover the issue of the greenery near the roads.

Building up of a **new recreational park U Čeňku on the territory of the City District Prague 14** (building in stages until 2011, the area of approx. 170 ha) belongs to the most important investment planned. The park should be dedicated to everyday short-time recreation of the citizens from the neighbouring developed area. This area now offers only walking trails, cycling and horse riding routes. Besides an important improvement in the greenery quality, the building of a multipurpose area for holding fairs, a concert amphitheatre, and a children playground is expected. On the shore of Lake Martiňák a swimming place with sand beach should be established. Ornamental orchard shall be also a part commemorating a historically important element of the Bohemian landscape. The whole premises should be interconnected with a paved road for in-line skating going to a cycling route. Expenditures for establishing the park are estimated to approx. CZK 600 mil.

The plan of developing the forest-park Letňany, 39 ha in area, is a part of the trend continuation in expanding of the forest areas for the purpose of recreation. The project documentation has been approved recently and will be implemented in the years 2008 – 2010.

A long-time discussed idea is also the development of the so-called “**Green Belt**” around the City. It is a joint initiative of the Capital City of Prague and the Central Bohemia Region with support of the Ministry of the Environment of the Czech Republic that started in 2001. This intention became a part of the Decision of the Council of the Capital City of Prague in 2003.

The Green Belt is understood as a belt of arable land and greenery that cannot be developed even after the year 2010. This belt is located along the City boundary. The Green Belt areas should be gradually converted to permanent grass land, forest, and scattered greenery. The purpose is to improve the environmental stability and conservation of the landscape nature, thus enhancing the housing and recreational values of the territory of the Capital City of Prague. When developing the belt, the basic problem is the ownership of the plots concerned. Some partial measures are already implemented on the plots owned by the City. Development of the Green Belt became a part of the Program Declaration of the Council of the Capital City of Prague for the period of 2006 – 2010 adopted at the beginning of 2007. Land acquisitions of certain plots valuable from the natural point of view is now undergoing. Their number is limited by the amount of allocated finances.

### **3.4 Documentation**

- Forecast, Concept, and Strategy of the Nature Conservation and Landscape Protection in Prague (2007)
- Principles of the Care of the Public Greenery in the Capital City of Prague (1996)
- The Land Use Plan of the Capital City of Prague
- Program Declaration of the Council of the Capital City of Prague for the period of 2006 – 2010
- The Forest Management Plan for 2004 - 2013
- Project documentation
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)

## 4. Quality of ambient air

### 4.1 Present situation and development, indicators

Air pollution on the territory of Prague is particularly measured by 15 stations of automatic monitoring system operated by the Czech Hydrometeorological Institute (the corresponding Czech acronym is ČHMÚ). This monitoring network is accompanied by 7 monitoring stations of the Public Health Institutes. The ČHMÚ stations are located in accordance with the EU directives that are fully transposed into Czech legislation. They are the Framework Directive 96/62/EC on ambient air quality assessment and management and the following daughter directives 1999/30/EC (SO<sub>2</sub>, NO<sub>2</sub> and NO<sub>x</sub>, particulate matter, and lead), 2000/69/EC (benzene and carbon monoxide), 2002/3/EC (concerning tropospheric ozone), and 2004/107/EC (concerning arsenic, cadmium, mercury, nickel, and polyaromatic hydrocarbons).

The respective monitoring stations in Prague are subdivided in two basic categories according to the classification of their location. In the first group the stations classified as urban and suburban are assessed – the monitoring stations are located further from busy roads in built-up urban areas; in the second group there are stations classified as traffic ones. In this group there is also the Station Prague 2 – Legerova, classified as a hot-spot; it is placed in a location burdened with heavy traffic, almost in the very centre of the City. At this locality, similarly to other localities of the Czech Republic burdened with automobile traffic, the immission limits for PM<sub>10</sub> particulates and NO<sub>2</sub> are most often exceeded.

#### Suspended particulate matter PM<sub>10</sub>

- Yearly immission limit value for human health - 40 µg/m<sup>3</sup>
- 24-hours immission limit value without harmful effects on human health - 50 µg/m<sup>3</sup>; this limit value may be exceeded only 35 times a year at maximum.

#### Average yearly concentration [µg/m<sup>3</sup>]

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	24	30	29	39	41	33	32	33	25
Traffic	33	38	36	39	46	40	36	42	33

#### The highest 36<sup>th</sup> 24-hour concentration measured [µg/m<sup>3</sup>] (35 admitted limit value exceedances)

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	39	48	49	66	73	47	54	54	44
Traffic	57	69	59	65	78	65	60	68	58

#### Number of the limit value exceedances of 24-hour concentration (50 µg/m<sup>3</sup>)

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	15.3	31	37	87.3	82.3	45.7	50	43	25.2
Traffic	52.4	69.2	64	77.6	109	79	70.3	84.1	61.4

In the period of 1999 – 2007 the highest concentrations were measured before the year 2003; since 2004 particularly the yearly average concentrations have had a decreasing trend. The exemption is 2006 when at the beginning of the year the whole territory of the Czech Republic as well as the Capital City of Prague suffered from bad disperse conditions that lasted for a few days and caused higher 24-hour concentration of not only PM<sub>10</sub> particulates.

According to a study that was undertaken in 2000 to 2007 and that excluded impacts of the meteorological conditions on the level of the PM<sub>10</sub> concentration the trend of the PM<sub>10</sub> immissions load on the territory of Prague has been decreasing.

### Nitrogen dioxide - NO<sub>2</sub>

- The yearly limit value without harmful effects on human health - 40 µg/m<sup>3</sup>, the margin of tolerance for the year 2008 – 4 µg/m<sup>3</sup>, deadline on which it shall be achieved is 31<sup>st</sup> December 2009.
- Hourly immission limit value without harmful effects on human health - 200 µg/m<sup>3</sup>, the margin of tolerance for the year 2008 – 20 µg/m<sup>3</sup>, this value may be exceeded 18 times a year at maximum, deadline on which it shall be achieved is 31<sup>st</sup> December 2009.

#### Average yearly concentrations [µg/m<sup>3</sup>]

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	29	27	31	31	33	28	28	30	25
Traffic	38	38	39	40	46	45	47	47	43

#### The highest 19<sup>th</sup> measured hourly concentration [µg/m<sup>3</sup>] (admitted 18 exceedances of the limit value)

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	97	90	93	102	128	97	108	118	98
Traffic	107	105	100	110	149	132	145	143	136

Localities with heavy traffic are the most load with nitrogen dioxide pollution; the lowest concentrations are measured by suburban stations in built-up areas.

The trend of the NO<sub>2</sub> concentration is similar to the development of PM10 particulates. Over the last years the highest concentrations appeared in the year 2006 due to unfavourable disperse conditions at the beginning of that year.

### Ground-level ozone - O<sub>3</sub>

- The target limit value for the maximum 8-hour moving average - 120 µg/m<sup>3</sup>, tolerated exceedance 25 times over three years on average; deadline on which it shall be achieved is 21<sup>st</sup> December 2009.
- Special immission limit value: informative threshold value – 180 µg/m<sup>3</sup>, warning threshold value – 240 µg/m<sup>3</sup>.

According to the EU directive, exceedance of the limit values without harmful effects on human health is assessed pursuant to the measured ozone concentration at urban and suburban stations.

#### Exceedance of the target immission limit value $120 \mu\text{g}/\text{m}^3$ by numbers (three-year average)

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Prague 8-Kobylisy	32.7	27.7	17	16	33.7	70	94.5	21.7	15.7
Prague 4-Libuš	26.7	24	22.7	19	34	64	99	31.3	34
Prague 6-Suchdol							40	39	37
Prague 6-Veleslavín	21.3	22.7	20.3	19	27	47	71.5	22.3	25.7
Prague 5-Stodůlky							28	32.5	31.3

#### Exceedance of the target immission limit values $120 \mu\text{g}/\text{m}^3$ by numbers (three-years average)

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	26.9	24.8	20	18	31.6	60.3	66.6	29.4	28.7

#### Exceedance of the special ozone immission limit value ( $180 \mu\text{g}/\text{m}^3$ ) by number of hours

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Prague 8-Kobylisy	0	4	0	0	20	0	0	16	0
Prague 4-Libuš	0	12	0	0	22	0	4	10	5
Prague 5-Stodůlky	–	–	–	–	–	0	0	19	4
Prague 6-Suchdol	–	–	–	–	–	0	1	24	10
Prague 6-Veleslavín	0	10	0	0	11	0	0	12	8

#### Exceedance of the special ozone immission limit value ( $180 \mu\text{g}/\text{m}^3$ ) by number of hours

Locality	1999	2000	2001	2002	2003	2004	2005	2006	2007
Urban and suburban	22.3	25	12.7	16.3	65.7	13.8	29.2	33	24

The least loaded are traffic localities where ozone is depleted by the chemical reaction with NO.

The increased concentration of ground-level ozone in summer months is a problem for the whole Europe. The ground-level ozone does not have its own important emission source; it is generated by a complicated system of photochemical reactions with solar irradiation effects.

## 4.2 Implemented measures

Before 1990 air in Prague was strongly polluted particularly with emissions from stationary sources, in majority of cases from the sources combusting solid fuel. The measures adopted at the national level, in part in legislation and in part in support funding, essentially influenced air quality after 1990. Further measures were implemented at the level of the Capital City of Prague (transport, energy industry and consumption, conversion of heating systems, etc.). Emissions from stationary sources have been successfully reduced (by orders of magnitude). Emissions from automotive transport are still the principal issue.

### Measures adopted at the national level

The Act No. 309/1991 Code on ambient air, laid down a duty for all operators of large and medium-sized air pollution sources to provide for adherence to stricter emission limit values and implementation of other technical conditions of the operation before the end of 1998. A

vast majority of operators had met the duty, which led to an essential decrease in emissions of practically all pollutants, particularly the particulate matter and sulphur dioxide. In 2002 the new Act No. 86/2002 Code on air pollution control was adopted that, together with its executive regulations, transposed the European Communities legal regulations while keeping those elements of the previous act that had been proven in practice. As regards other legal regulations important for ambient air quality in the Czech Republic, the important one is especially the Act No 76/2002 Code on the integrated pollution prevention and control as on the territory of the City agglomeration there is a number of facilities operated that fall within the integrated pollution prevention (IPPC) regime, and further legal regulations on requirements for engine vehicle operation and quality of fuel.

In the field of emissions from small-sized pollution sources the support for the implementation of gas utility systems and other measures were important that were provided by the State Environmental Fund both within its standard programmes as well as within the National Programme for Healthier Air.

### **Regional and local measures**

On the territory of the Capital City of Prague a number of measures were implemented in the past that contributed to improved air quality. In some cases the measures directly focused on the reduction of emissions and immissions of pollutants; yet often they were instruments whose main purpose was different and their contribution to the improved air quality of was a desirable side-effect. They were particularly the support to measures in transport and energy industry. The most important instruments and measures implemented in transport and stationary sources have been the following:

Transport:

- the development of the Prague Integrated Transport System;
- support to high quality of public city transport ;
- support to the preferred public city transport;
- building-up of routes of the public rail transport (the underground, tramways);
- building-up of a high-capacity road network;
- support to bicycle and pedestrian transport;
- limiting of the heavy truck entry into selected City areas; and
- building up and operating of the park-and-ride parkings.

Stationary sources

- the development of the Central Heating Supply System (CHSS) and its connection to the heating supply pipeline Mělník;
- implementation of the gas utility network on the whole territory of Prague; and
- the Programme of subsidies of the City of Prague for heating systems conversion on the City territory (see Chapter 1 Climate change)

In Prague a number of other instruments and measures arising directly from activities of the self-governing authorities and performance of public administration bodies are implemented not only in the area of air pollution control but also in other related areas (transport, land use procedure, EIA, IPPC, and others). Taking requirements for air pollution control in the basic strategic, conceptual, and urban materials is also an important element thereof.

### **Registration of air pollution sources in records, model calculations of air quality**

Long-term time series of emission data records generated by various size categories of stationary sources (large, medium-sized, small/area) are available thanks to the records of the

Air Pollution Sources Register (the corresponding Czech acronym is REZZO 1, REZZO 2, REZZO 3), which is provided for by the Czech Hydrometeorological Institute at the national level. The development since 1980 is documented in the following table.

**Emissions of the selected basic pollutants generated by stationary sources in Prague in 1980 – 2006 (t/year)**

Year	Particulates	SO <sub>2</sub>	NO <sub>x</sub>
1980	28,633	60,706	17,423
1985	25,132	66,107	19,295
1990	21,011	45,367	16,173
1995	7,294	24,722	7,536
2000	1,424	2,916	4,019
2001	1,381	3,006	4,098
2002	663	1,807	3,247
2003	707	1,868	3,083
2004	791	2,495	3,662
2005	578	2,434	3,421
2006	596	2,146	3,428

The increasing impacts of traffic on air quality in the City can be documented by the growing number of registered vehicles on the territory of the Capital City of Prague and by traffic volumes (source TSK – ÚDI).

The level of motoring and car ownership (the number of vehicles, or cars per 1,000 inhabitants) and traffic volumes (million of vehiclekilometers / average workday from 0 to 24 o'clock)

Year	Number of inhabitants	Level of motoring	Level of car ownership	Traffic volume
1971	1,082	188	123	
1981	1,183	310	241	
1990	1,215	353	276	7.3
1995	1,210	530	443	12.9
2000	1,181	632	525	16.6
2005	1,180	635	510	19.9
2006	1,188	640	510	20.3
2007	1,212	644	506	20.9

In the national classification traffic emissions are classified as the REZZO 4 category. The approximate share of traffic emissions of the total emissions of respective pollutants over recent years has been the following: 75 % particulate matter, 20 % SO<sub>2</sub>, 80 % NO<sub>x</sub>, 90 % CO, and 50 % VOCs.

The Model Assessment of Air Quality on the Territory of the Capital City of Prague is calculated within the ATEM Project every two years. The Project uses and supplements information on emission sources, employs other information (disperse conditions, data on the territory – GIS, demography) and its results document detailed territorial distribution of air quality (calculation in the network of almost 9 thousand reference points at the 250-metre interval). Thanks to a series of repeated calculations (the basic one in 1992 and further 6 updates; the last one in the year 2006) and combined with the system of the air quality measurements the development of state can be compared, effectiveness of the implemented



measures can be assessed, and the respective data and instruments used for assessing of the impact of the planned investment plans (EIA) may be evaluated.

Through the Prague Environmental Information System and its outputs (the Yearbook, the Atlas, the ENVIS web sites, CDs) and other specific Internet applications (PREMIS) the information on air quality is available to the public (see in detail in Chapter 11 Other Measures).

The air quality monitoring system of is connected to the Smog and Regulation System for Air Pollution Sources Control and for Keeping the Population Informed (by all media) in case pollution exceeds the limit values and in case there are unfavourable disperse conditions. The system is run by the ČHMÚ in cooperation with the Capital City of Prague.

### 4.3 Objectives and planned measures

The major document that includes objectives and measures for air pollution control is the **Regional Integrated Programme of Emission Reduction and Air Quality Improvement on the Territory of the Capital City of Prague Agglomeration** (hereinafter as the Programme). The main purpose of the Programme is to ensure air quality on the whole Prague territory as laid down by legislation and to contribute to observance of obligations which the Czech Republic committed to concerning the pollutant emissions abatement.

Based on the analysis of the current state of air pollution the Program is formulated for the following priority pollutants: suspended particulate matter fraction PM<sub>10</sub>, nitrogen dioxide, carbon monoxide, benzo[a]pyrene, ground-level ozone, nitrogen oxides, and volatile organic compounds.

The general objectives of the Programme are set as follows:

- for pollutants of which the immission limit values happen to be exceeded – to achieve the reduction in concentrations below the limit value level on the whole Prague territory – short-term urgency;
- for pollutants of which the target immission limit values happen to be exceeded – to achieve the reduction in concentrations below these target limit values – medium-term urgency;
- by the established date (2010) to adhere to recommended values of the regional emission limits for sulphur dioxide, nitrogen oxides, VOCs, and ammonia – medium-term urgency; and
- for pollutants of which the target immission limit values are not exceeded – keep the immission load below the limit; long-term urgency.

The concrete Programme objectives in relation to the respective pollutants are, pursuant to the analysis, set as follows (the first two objectives being the most urgent):

- reduction in the suspended particulate matter PM<sub>10</sub> immission load (*exceedances of the immission limit values*);
- reduction in the nitrogen dioxide immission load (*exceedances of the immission limit values*);
- reduction in the carbon monoxide immission load of (local exceedances of the immission limit values);

- reduction in the benzo[a]pyrene immission load (exceedances of the target immission limit values);
- reduction in the production of nitrogen oxides emissions (exceeded value of the regional emission ceiling, precursor of the ground-level ozone formation); and
- reduction in the production of volatile organic compounds emissions (exceeded value of the regional emission ceiling, precursor of the ground-level ozone formation).

The priority categories of air pollution sources, to which the respective measures of the Programme are connected, were classified as follows:

- **Priority 1. Automotive Transport:** decisive share of suspended particulate matter of fraction PM<sub>10</sub>, nitrogen oxides / nitrogen dioxide, and carbon monoxide emissions, important share of volatile organic compounds emissions.
- **Priority 2. Small combustion sources:** important contribution to suspended particulate matter of fraction PM<sub>10</sub>, and nitrogen oxides / nitrogen dioxide emissions, decisive share of benzo[a]pyrene emissions.
- **Priority 3: Sources of secondary dust nuisance:** important contribution to suspended particulate matter PM<sub>10</sub> immission load.
- **Priority 4: Consumption of organic solvents:** important source of volatile organic compounds emissions.

It can be unambiguously stated on the basis of the developed analysis that **the automotive transport is the decisive pollution source category**. Thus the majority of measures focused on the air quality improvement concentrates on this category. The following table gives the overview of measures and concrete activities. Pursuant to the cost benefit analysis carried out the most important measures are also classified in terms of costs (H – high-cost ones, L – low-cost ones) and their efficiency (%).

PRIORITY 1. REDUCTION IN EMISSION AND IMMISSION LOAD OF AUTOMOTIVE TRANSPORT		
1.1. Measures for the reduction in the number of automobile rides		
1.1.1. Support to high quality of public transport	67%	H
1.1.2. Organisational measures leading to preference of the Public City Transport	7%	L
1.1.3. Limitations to heavy trucks entry into some parts of the City	57%	L
1.1.4. Time management of the supply delivery	8%	L
<b>1.1.5. Parking policy in the City Centre and in the Local Centres</b>	Max.	L
1.1.6. Support to the park-and-ride parkings	8%	H
1.1.7. Reduction in sources and destinations of automotive transport	31%	L
1.1.8. Support to bicycle transport	2%	H
1.1.9. Establishing pedestrian zones and other types of calmed roads	7%	L
1.2. Measures in transport infrastructure		
<b>1.2.1. Building-up of a network of high-capacity roads</b>	100%	H
1.3. Measures leading to reduction in specific vehicle emissions		
1.3.1. Operational checks of vehicle emission parameters	63%	H
1.3.2. Reduction in emissions from the Public City Transport buses and other vehicles owned by the City	23%	H
1.3.3. Complete support to the alternative fuel use in automotive transport	8%	H

PRIORITY 2: REDUCTION IN EMISSION AND IMISSION LOAD GENERATED BY SMALL COMBUSTION SOURCES		
2.1. Development of energy industry infrastructure		
2.2. Reduction in the solid fuel consumption in households		
1.2.1. Support to the conversion of heating systems and prevention of the solid fuel reuse in households	5%	L
PRIORITY 3: REDUCTION IN PM <sub>10</sub> EMISSIONS – SECONDARY DUST NUISANCE		
3.1. Reduction in secondary dust nuisance		
3.1.1. Reduction in dust nuisance emissions generated by area sources		
3.1.2. Reduction in traffic dust matter	44%	H
3.1.3. Reduction in dust nuisance by means of the greenery planting	29%	H
PRIORITY 4: REDUCTION IN VOLATILE ORGANIC COMPOUNDS FROM THE SOLVENT CONSUMPTION		
4.1. Support for the application of water-based paints		
SUPPORTIVE MEASURES APPLIED ON THE WHOLE AREA		
5.1.1. Land use planning	20%	L
5.1.2. Land use decision-making process		
5.1.3. Programme for keeping the public informed and for education of the population	6%	L
5.1.4. Terms for public contracts awarding (tendering)	5%	L

Based on the conclusions of the analysis, the following procedure has been selected for implementation:

- The “low-cost” activities can be implemented in full as the expenditures on their implementation would not probably mean a fundamental item to the City Budget;
- Out of the so-called high-cost activities priority will be given to those whose final efficiency exceeds 20 %. These are particularly the following ones:
  - building up of the high-capacity road network;
  - support to high quality public transport;
  - reduction in particulate matter emissions generated by traffic;
  - reduction in dust nuisance by means of the greenery planting; and
  - reduction in emissions generated by the Public City Transport buses and other vehicles owned by the City.

Certain measures leading to the air quality improvement are long-term measures and will be probably completed within a time horizon exceeding 10 years. It holds particularly to ideas pertaining to the construction of transport and energy industry infrastructure:

- full completion of the high-capacity road network represented by two road rings and the system of radial roads;
- significant development of public rail transport networks (particularly the underground, but also tramway and railway routes) with the aim to provide for the maximum public city transport service on the whole territory of the City;
- continuation in the territorial suburban transport development and deepening of the integration of the respective public transport systems;
- development of the Central Heating Supply System network on the left riverside of the City, and

- essential technological vehicle adjustments – use of alternative fuel, etc.

Fulfilling the long-term objectives of the concept as well as the Programme is declared in the Programme Declaration of the Council of the Capital City of Prague for the period of 2006 – 2010. The continuous following of the Programme fulfilment and management is provided for by the Commission of the Council of the Capital City of Prague for the Implementation of the Integrated Programme of Emission Abatement and Air Quality Improvement.

#### **4.4 Documentation**

- Integrated Regional Programme of the Emission Reduction and Air Quality Improvement on the Territory of the Capital City of Prague Agglomeration (2006)
- Long-term Plan of Air Pollution Control in the Capital City of Prague (2003)
- Documentation of the REZZO registration
- Documentation of the ATEM Project – Model Assessment of Air Quality on the Territory of the Capital City of Prague
- Yearbook Prague – Traffic 2007 (TSK – ÚDI)
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)
- Web site <http://www.premis.cz> (the Prague Environmental Monitoring and Information System)
- Web site <http://www.chmi.cz> (Section of Air Pollution Control)

## 5. Noise pollution

### 5.1 Present situation and development, indicators

Results of the Strategic Noise Map, developed in 2007 for the City of Prague and its close surroundings (the Prague agglomeration) confirmed that the most important source of noise in Prague is the road traffic. The largest territory with exceeded noise limits, as set in the Decree of the Ministry of Health of the Czech Republic No 523/2006 Code is in the vicinity of major road routes. (Note: for the road traffic,  $L_{den} = 70$  dB and  $L_n = 60$  dB).

Concerning the railway traffic system and its location in relation to protected developed areas, railway traffic noise may be locally important; however, it is obvious that on the territory of the Prague agglomeration it is not so much important source of noise immissions. This conclusion similarly applies to air traffic noise.

The least important is noise from the integrated industrial facilities, among others thanks to the systematic work of the Public Health Authority. There is no very noisy industrial plant on the territory of Prague agglomeration noise from which could notably spread to wider surroundings. As regards to industrial production, the most important noise source is its service traffic.

**The share of population having the load of daytime noise  $L(\text{day})$  above 55 dB(A) is 87% (1.038 mill. inhabitants). The share of population loaded with night time noise  $L(\text{night})$  above 45 dB (A) is 85 % (1.06 mill. inhabitants).**

The given values are based on estimations developed on the basis of recommendations of the WG-AEN (EC Working Group – Assessment of Exposure to Noise) and END (Environmental Noise Directive). That is, all inhabitants in a particular house are assigned to the highest noise immissions on the façade of the house measured 4 meters above the ground. It is easy; however, it overestimates noise nuisance. Especially in the case of bigger houses many inhabitants are constantly exposed to significantly lower noise immission values, particularly if their flats are oriented only toward quiet façades. Estimations were developed by the City Development Authority of the Capital City of Prague, using data of the Strategic Noise Map and a geographic analysis.

The following table gives data on the number of inhabitants (in thousands) exposed to noise in the Prague agglomeration according to the Strategic Noise Map:

Volume interval (dB)	Roads		Railways		Airports		Industry	
	L <sub>den</sub>	L <sub>n</sub>	L <sub>den</sub>	L <sub>n</sub>	L <sub>den</sub>	L <sub>n</sub>	L <sub>den</sub>	L <sub>n</sub>
40-44	-	116.2	-	66.6	-	1.7	-	0.1
45-49	-	463.7	-	57	-	27	-	<0.1
50-54	95.4	312.8	64.2	45.2	7.4	0	<0.1	0
55-59	465.3	144.1	50.9	52.6	0.7	0	0	0
60-64	334.9	68.9	44.3	26.2	0	0	0	0
65-69	146.7	16.5	49.6	0.4	0	0	0	0
70-74	68.9	0.6	12.2	0	0	0	0	0
>75	12.6	0	<0.1	0	0	0	0	0

L<sub>day</sub> - index of the total noise nuisance (daytime, evening time, night time)

L<sub>n</sub> - noise index of the sleep interference (night time)

The Strategic Noise Map was developed for the first time in 2007; the values for the previous years are therefore missing. However, in the years before, the Noise Maps of Automotive Transport were developed that were based on similar data (traffic on selected road routes, road pavement types, speed, vicinity of the roads, etc.), but they used a different calculation methodology (the level of noise at calculation points on facades of buildings). In 2008 the Project ENVIS4 was implemented, under which traffic noise of the almost complete road system on about a third of the territory of the City was assessed.

The automotive transport growth over the last 10 years is in parallel with the growth of noise level in the outdoor environment. This growth is, if possible, continuously compensated for by the implementation of noise control barriers.

## 5.2 Implemented measures

Besides measures taken to overall reduction of the automotive transport (or the speed thereof) in the City centre and developed areas (see the chapter on traffic), respective road administrators and transport operators implemented a broad range of technical measures.

### Road traffic and Public City Transport

Reconstructions, repair works and continuous maintenance of road pavement (2007 – 2008)

- 29 implemented events (renovation of the road pavement, replacement of the road pavement, replacement of stone pavement with bitumen one, newly built roads, reconstruction works encompassing the replacement or renovation of the road pavement) – expenditures amounting to CZK 828 mil.

Building of noise control barriers (NCB) and noise control structures (2007 – 2008)

- 24 implemented events or events to be finished this year (eg. NCB in Újezd, NCB in Chodov, NCB in Jinočany, NCB in Dolní Počernice, NCB in Zbuzany, NCB in Kbelská, NCB along two bridges of the South Connection, NCB along Průmyslová Bridge, NCB Horní Počernice, NCB in Řeporyje);

- Windows replacement has been in progress since 1998 at the Prague agglomeration localities exposed to noise (City Districts: Prague 12, Prague 21, Prague 4; Milady Horákové Street, V Holešovičkách Street, within new constructions);

Measures pertaining to Public City Transport operation (tramways, the Underground, etc.)

- Within the complex solution to eliminate the negative effect of noise, the General Plan for the reduction of tramway traffic noise was developed in 2003. It defined three basic topics: I – Preparation for the noise reduction (determination of noise sources and measures for its reduction), II – Solution of the transport route noise, III – Solution of the tramway carriage noise.
- Concerning the noise reduction since the first half of the 1990s the Public City Transport Co. of the Capital City of Prague has been addressing the issue of the tramway routes design. Anti-vibration mats and noise control elements have been gradually installed. In 2003 – 2008 tramway routes were equipped with anti-vibration and noise control elements as follows: Sokolovská Street (sections Florenc – Urxova, Balabenka – Poliklinika Vysočany), Koněvova Street (section Ohrada – Vápenka), Na Poříčí Street, Chotkova Street, Nádražní Street, Senovážné Square, Výtoň Crossing, Těšnov Crossing, Vltavská, Sokolovská/Zenklova, Zenklova/Na Žertvách, Svobodova/Na Slupi, Palackého Square, and recently implemented tramway routes Hlubočepy – Barrandov and Laurová – Radlická. the overall reconstruction of all routes in the residential areas is planned by 2022.
- At critical localities the noise level is checked by measurements. The surface of rails is ground and polished within regular maintenance.
- The solution of the tramway carriage noise is focused on the optimising of wheel VM profile, noise conditions in driver's cabin, tramway carriage body, gear, traction motors, brakes, electric equipment, and wheel balancing. The criteria of the noise reduction are applied in the purchase of new tramway carriages.
- As regards the Underground adjustments, the most important are: antivibration adjustments of the route, rail surface grounding, replacement of sleepers, selection of new carriages taking into account noise parameters, lubrication of the tyres of the underground carriages, etc.

### **Measures relating to air traffic**

- Declaration of the airport noise protection zone and implementation of noise control modification to structures – expenditures amounting to CZK 578.5 mill., of which CZK 166 mill. were in the Prague agglomeration (1998 – 2007).
- Preference of runway systems with the aim to limit noise nuisance in the airport vicinity.
- Reduction of air traffic noise in night-time.
- Limitation of noisy types of aircraft.
- Modernisation of the monitoring system of air traffic noise and air routes.
- Limitations to engine testing and movement of aircraft on the ground.

### 5.3 Objectives and planned measures

Based on the Strategic Noise Map the Action Plan for the noise reduction in the Prague agglomeration was developed that pays the greatest attention to the road traffic noise, as the most important noise source. The basic measure that will essentially affect road traffic in the agglomeration is the gradual construction of the Prague Outer Ring Road and the City Ring Road. In most cases the routes of the ring roads are led far enough from build-up areas. The ring roads will take the transit traffic off the City and will also be used for traffic inside the agglomeration. Besides partial measures shall be implemented as follows:

#### Road traffic and Public City Transport

Reconstructions, repairs, and continuous maintenance of the road pavement (2008 - 2016)

- 12 planned events of the current road pavement replacement – expenditures amounting to CZK 360 mil.
- Monitoring of the development of quiet (“whispering”) road pavements and their application.

Reduction of speed on the roads of the Prague agglomeration

Traffic control, including reduction in transit and heavy truck traffic

#### Measures related to Public City Transport traffic

- Flexible rail fixation – pilot operation;
- Purchase of new buses;
- Renovation of tramway routes ;
- Increasing the Public City Transport attractiveness.

Building of the noise control barriers (NCB) and noise control walls

- 2 noise control walls on the territory of the City District Prague 12, NCB Dolní Počernice, NCB Horní Počernice – 2<sup>nd</sup> stage.

Introducing a toll for vehicle entering to the City centre

Procedure shall obey the conclusion following from the Action Plan for the Noise Reduction in the Prague Agglomeration 2008

#### Measures related to air traffic

- Review of observance of noise zones and flight routes – expenditures of monitoring amounting to CZK 17 mil.
- Permanent implementation of noise insulating measures on structures in the airport surroundings – expenditures amounting to CZK 50 mil.; furthermore on buildings in the noise protective zone of parallel runways before launching a new runway – expenditures amounting to CZK 500 mil.
- Construction of a parallel runway – expenditures amounting to CZK 9 billion; modifications to the organisation of the use of the pair of parallel runways.



- Construction of an acoustic equipped motor stand – expenditures amounting to CZK 100 mil.
- Reduction in noise exposure in night-time by means of the reduction in aircraft movements down to 5% of the current number as well as by means of reduction in engine testing and withdrawal of unsuitable types of aircraft from the night traffic.
- Determination of optimal routes for arrivals and departures with view to noise nuisance imposed on residential areas.
- Extension of the noise monitoring system – expenditures amounting to CZK 6 mil.
- Levying a charge on infringement of rules leading to noise limits exceedance; reduction of noisy aircrafts – expenditures amounting to CZK 17 mil. for the monitoring.

#### **5.4 Documentation**

- Automotive Transport Noise Maps in Prague (2000 – 2006)
- Strategic Noise Map of the Prague Agglomeration 2007 (supplied by Akustika Praha s.r.o., ordered by the Ministry of Health of the Czech Republic)
- Action Plan for the Noise Reduction in Prague Agglomeration 2008 (supplied by Akustika Praha s.r.o., ordered by Prague City Hall)
- Project documentation and outcomes of the ENVIS4 project
- Report on Noise Conditions at the Prague Ruzyně Airport in 2006 – 2007, June 2008
- Action Plan of the Prague Ruzyně Airport, April 2008
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)

## 6. Waste production and management

### 6.1 Present situation and development, indicators

#### Amount of waste per inhabitant

**In 2007, the Capital City of Prague produced 574 386 tonnes of municipal waste, i. e. 480 kg per inhabitant per year.**

The following table gives the development of the municipal waste (MW) production in tonnes and its conversion per inhabitant (kg / inhabitant) in 2002 – 2007. The data come from the database of waste register administered by the Department of Environmental Protection of the Prague City Hall.

Year	Municipal waste production per year	
	(t)	(kg/inhab.)
2002	521 084	450
2003	514 442	443
2004	587 724	504
2005	502 011	427
2006	541 634	458
2007	574 386	480

#### Share of total / biodegradable waste disposed by landfilling

In 2007 the Capital City of Prague, as a waste producer, produced about 365.2 kt of municipal waste. Out of that about 18 % was disposed by landfilling. Provided that municipal waste may contain up to 41 % of biologically degradable waste, one may say that in 2007 about 25.8 kt of biological waste was disposed by landfilling.

#### Percentage of recycled municipal waste

In 2007 the total yearly production of municipal waste on the territory of the Capital City of Prague was approx. 574 386 tonnes. In that year the City of Prague itself (as the municipality) produced 365,166 tonnes of municipal waste, of which approx. 2 816 tonnes of paper, approx. 9 713 tonnes of plastics, approx. 11 421 tonnes of glass, approx. 536 tonnes of beverage cardboxes, and c. 4 03 tonnes of biological waste were sorted out. The share of recycled municipal waste of the total waste produced by the City was approx. 13.8 %.

The total yearly municipal waste production in the City and sorted waste in 2000 – 2007 is given in the following table (in tonnes).

Year	Total waste production of the City (t)	Paper (t)	Glass (t)	Plastics (t)	Beverage cardboardes (t)	Biological waste (t)	Share of sorted waste (%)
2000	264 924	11 562	6 059	4 675			8.42%
2001	270 740	12 139	5 044	3 586			7.67%
2002	299 012	13 777	6 761	5 091		1 665	9.13%
2003	404 058	16 198	7 501	6 092		6 450	8.97%
2004	347 409	18 208	8 023	6 667		3 617	10.51%
2005	340 673	19 299	8 865	7 331	171	3 903	11.61%
2006	370 426	22 339	9 946	8 114	424	3 614	12.00%
2007	365 166	23 816	11 421	9 713	536	4 803	13.77%

## 6.2 Implemented measures

### The complete system of waste management

In accordance with the Waste Management Plan of the Czech Republic the Capital City of Prague supports the reduction in waste share disposed by landfilling and at the same time prefers using waste produced on its territory as an energy source .

On the territory of the Capital City of Prague there is only one licensed landfill in Ďáblice, which is operated by the company of .A.S.A. s.r.o. This landfill has been implemented in two stages. The first stage terminated in 2005 and currently its second stage is under operation with full termination in 2013 (the expected filling-in of this landfill is in 2009). The City of Prague makes use of only limited capacity of the landfill implemented by means of the company of Prague Services a.s. as the waste collection company.

Vast majority of municipal waste ends in the Prague Incineration Plant in Malešice (Facility for the energy use of waste – ZEVO) which is, with its capacity, able to handle all mixed municipal waste (if combustible) produced by the citizens living on the territory of the Capital City of Prague. At present about 200 thousand tonnes of municipal waste is used for the energy generation yearly (the full capacity of the facility is 310 thousand tonnes). In 2010 a cogeneration plant is planned to be put under operation. After its commissioning further growth of the energy generated will be oput inot the electricitiy output. The heat production is currently at the level of 1,200 GJ / year.

In Prague a complete system of waste management has been introduced, thanks to which the citizens are also financially motivated to sort waste and the sorted waste collection is funded by the City. The collection and transport of mixed municipal waste is charged pursuant to the amount of the waste produced. The more waste the citizens sort out, the less they are charged for the collection of the remaining mixed waste. The overall City area system has been introduced by means of the gradually implemented Waste Management Project. Within this system categories of waste are sorted as follows: paper and cardboard, coloured glass, clear glass, bulky waste, mixed waste, hazardous waste, beverage cardboardes, ferrous and non ferrous metals, demolition waste, electrotechnical waste, waste from the greenery management, waste wood, tyres. The first stage of the project was implemented in 1998 – 2001 (2,800 collecting points for paper, glass, and plastics). The second stage of the Project has been implemented in 2002 – 2011.

At present the objective has been achieved and there are approx. 3,120 collecting points – 1 collecting point per approx. 500 citizens in residential tenement houses areas and 1 collecting point per approx. 200 citizens in family houses areas. All points have vessels for glass, paper, and plastics. Selected points have a wider opportunity for sorting – there is a chance to collect also beverage cardboxes (approx. 2,200 points) and clear glass (approx. 540 points).

The Capital City of Prague is also the founder of 11 collecting yards where the citizens may turn sorted waste (bulky waste, demolition waste, waste wood, waste from greenery management, metal waste, paper, glass, plastics, beverage cardboxes, and hazardous components of municipal waste) and within the re-taking also discarded electrical equipment. Other 6 collecting yards are operated by the respective City Districts.

Within the system the hazardous components of municipal waste are collected at 23 stationary collection places of hazardous waste and by means of mobile collection (collecting stops) at 250 routes with 8 collecting stops each. Unused hazardous medicines are collected in 280 pharmacies from where they are collected by the City.

Besides turning bulky waste to the collecting yards, the citizens may also turn it to regularly distributed large-capacity containers. In 2007 the City provided for 9,764 of such containers.

Similarly as for other components of municipal waste, the Prague citizens may turn biological waste into 11 collecting yards and in the Composting Facility of the Capital City of Prague free of charge. In 2004 – 2007 the Pilot Project of the Sorted Collection of Municipal Biological Waste into specially ventilated vessels was successfully completed with participation of 800 households. Its prolongation until 2009 is now being prepared. Since 2007 the City has provided for its citizens the service of distributing of large-capacity containers for biological waste (especially in spring and autumn). All collected municipal biological waste is processed by means of the aerobic composting.

### **Education and campaigns**

The complete system introduction is accompanied with necessary education and media campaigns. In 2007 and 2008 questionnaire pools and information events were carried out focused on the support of the household composting (e. g. an information brochure). In 2008 Prague is offering to schools the opportunity to participate in the project “composting in school gardens”. There are 44 schools participating now and further enlargement is anticipated. Since 2004 Ecological Educational Campaigns for 1<sup>st</sup> grade pupils of Prague elementary schools have been organised every year (games, information materials). In 2008 about 226 primary schools with approx. 9,300 first-grade pupils participated in.

Another project in progress is the annual series of lectures on waste issues for the teachers of Prague elementary schools and kindergartens. The lectures are yearly on average attended by 70 teachers from 65 schools. In the school year 2007 / 2008, the 14<sup>th</sup> ecological collecting competition was held at the Prague schools and then called “Nestlé and the Czech Secondary Raw Materials Co. Grand Prix” took place (100 schools participated in).

An information campaign is organised for the general public every year at the celebration of the Day of the Earth ( for the fourth time in 2008).

In 2007 and 2008 leaflets on waste sorting were distributed to all Prague households and other information campaigns for the support of waste sorting were implemented.

The Prague City Hall also provides for the agenda of grants for funding environment improving projects in the City of Prague in which one of the important circle of issues is, among others, environmental bring-up and education on waste management.

Waste management forms also an integrated part of the Information System on the Environment in Prague, including also the development of the Yearbook Prague – the Environment, thematic web sites (envis.praha-mesto.cz), and specialised internet applications for the public (e.g. maps – the Atlas of the Environment).

### 6.3 Objectives and planned measures

In 2009 the City of Prague plans a promotion event to support the household composting and, subsequently, the introduction of the organised collecting of sorted biological waste with financial participation of the Prague inhabitants. Ideally then a citizen when paying another charge for the sorted collection of municipal biological waste will save money (because the capacity of their mixed municipal waste vessels will be lower and that will mean that the charge for their mixed waste, which is higher than the one for biological waste, will be decreased).

As regards the promotion of household composting motivating of the citizens is expected as for instance a financial contribution for the purchase of composting utilities (about CZK 500 per a landlord).

In 2009 the construction of two facilities for the municipal plant biological waste processing is planned. At present feasibility studies are being developed (investment approx. CZK 20 mil. per a composting facility).

The development of a network of the municipal biological waste processing facilities (at least 4 strategically located facilities on the territory of Prague) and the expansion of the organised biological waste collecting in Prague (the bussines plans have been approved and are obligatory incorporated into the Prague Waste Management Plan) are among long-term measures.

In accordance with the fulfilling of the objectives of the Waste Management Plan of the Czech Republic, the Capital City of Prague supports the increase in material reuse and energy use of municipal waste up to 50 % by 2010. Depending on its technical and economical possibilities the City will give priority to energy use of mixed municipal waste, when processing mixed municipal waste, to its disposal by landfilling and will support the installation of an electricity generating turbine in the Prague Incineration Plant in Malešice.

#### Conceptual documents

The City has developed the appropriate conceptual documents that are in compliance with the Waste Management Plan of the Czech Republic and the valid EU Directives (the Waste and Landfill Directives) for the development of waste management.

Prague, which is legally both the municipality and the Region, has developed 2 waste management plans (WMP): the regional **Waste Management Plan of the Capital City of Prague** and the **Waste Management Plan of the Capital City of Prague as a waste producer**. The regional WMP of Prague was developed on the basis of the Waste Management Plan of the Czech Republic and the strategic documents of the City. The purpose of the concept is to establish conditions preventing the waste production and management in compliance with the Act on Waste. The goal was to establish such an integrated system of waste management that would make the current system more effective and would give priority to material waste reuse or energy use than to waste disposal. The WMP of the City of Prague was developed for the period of 10 years (2004 – 2013). Prague determined the

binding part of the plan in an Ordinance of the Capital City of Prague effective since 1<sup>st</sup> January 2006. Following the regional WMP of Prague and in compliance with requirements of the Act on Waste the WMP of Prague as the Waste Producer was developed in 2006 for the period of 5 years (2006 – 2010).

#### **6.4 Documentation**

- Waste Management Plan of the Capital City of Prague
- Waste Management Plan of the Capital City of Prague as the Waste Producer
- Registration administered by the municipality in compliance with Section 39, para 7 of the Act No. 185/2001 Code on waste (EVI)
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)
- Web sites <http://www.premis.cz/atlaszp> (Atlas of the Prague's environment)

## 7. Water consumption

### 7.1 Present situation and development, indicators

#### Drinking water supply, measuring of supply

The supply of drinking water and the discharge and treatment of waste water are essential services provided by the Capital City of Prague. To ensure these services, water management infrastructure projects have been built systematically on the City territory for more than a hundred years. In size and value they are among the most significant items on the list of the City capital assets. The owners of the water supply system and sewerage systems are required by law to keep their operation continuous and safe. The public character of these services is attested, among other things, by their affordability, reliability, and effectiveness.

Since 1998 the Prague water supply system and the accompanied treatment plants supplying the population with drinking water have been administered by a joint stock company, Pražská vodohospodářská společnost, a.s. (PVS) (Prague Water Management Company). Prague's water supply system is operated by another joint stock company, Pražské vodovody a kanalizace, a.s. (PVK) (Prague Water Supply and Sewerage Company), a member of Veolia Voda Group.

Pražské vodovody a kanalizace, a.s. (PVK) supplies the population in Prague (and its surroundings), including households, and also measures water consumption. Altogether 88 200 houses, or 551 243 flats, are registered in Prague, 99.1% of which have been connected to the public water supply system for nearly twenty years (source: Czech Statistical Office, Census 2001). **Practically all water supply (more than 99.8%) is measured by the customer water meters.** Note: There are 105 021 off-take points (water meters) in Prague. An exception is 170, or 0.16% customers, who, for technical reasons, have their water consumption fixed by a flat rate.

For illustration, the table gives data on water production since 2002 (industrial water not included).

Year	Number of inhabitants supplied from public mains	Total water production, drinking water and industrial water ('000 m <sup>3</sup> )	Drinking water supply for consumption ('000 m <sup>3</sup> )	Drinking water supply for consumption (person/day)
2002	1 154 000	145 963	133 423	315
2003	1 162 000	142 654	128 588	303
2004	1 165 000	136 427	122 203	287
2005	1 172 000	132 264	118 052	276
2006	1 184 000	131 746	116 630	269
2007	1 204 800	129 136	113 420	255

The largest source supplying Prague with water is the Želivka Drinking Water Treatment Plant (73% in 2006, source is the Švihov Water Reservoir), followed by the Drinking Water Treatment Plant in Káraný (24%). Both sources are situated outside of Prague. The Drinking Water Treatment Plant in Podolí, lying by the Vltava River on the territory of the City, has been in little use in recent years (approx. 2%) and it only serves as a spare source.

### Water consumption

The specific drinking water consumption per capita has dropped by nearly 40% since 1990.

**Current consumption amounts to 127 litres per person/day. The specific household water consumption after 2000 is shown in the following table:**

Year	Consumption (L/person/day)
2000	143
2001	138
2002	135
2003	137
2004	131
2005	127
2006	129
2007	127

The consumption decrease has been influenced by the raising of the water charge and sewage levies, which are slightly below the national average in Prague, and by the long-term campaign aimed at making people behave more economically in water consumption. At present possibilities of further savings in water consumption, however, have been practically exhausted, and no major changes in the current trend are expected.

Note: Since 1 February 2008, the price of water in Prague has been fixed at 53.01 CZK/m<sup>3</sup> including 9% VAT (water charge rate: 28.54 CZK/m<sup>3</sup> and sewage levies 24.47 CZK/m<sup>3</sup>).

### Water distribution and losses

Owing to the rather difficult terrain the water distribution on the City territory is very demanding technically. Prague has 3601 km of water mains, 736 km of conduits, 39 pumping stations and 67 storage reservoirs with capacity of 947 214 m<sup>3</sup> (source PVK a.s., 2007). Due to its age, bed conditions, transport load, material structure, corrosion, and other factors the water distribution system is showing a relatively high failure rate. More than 1000 km (nearly one-third) of the total length of Prague's water supply system is more than 60 years old.

Since 1996, when the water loss reached a record high of 46%, water losses have been reduced successfully. One of the important measures to reduce losses is the subdivision of the water supply system into several parts (supply zones), which are continuously monitored and evaluated in combination with active spotting of hidden water leakages. **Current losses of water in the distribution system amount to 20%.**

The development in water losses since the year 2000 are indicated in the following table:



Year	Water losses in the distribution system (%)
2000	34.17
2001	33.65
2002	31.86
2003	28.72
2004	26.61
2005	25.78
2006	23.79
2007	20.58

Measures have been prepared for the further water loss reduction. The expected value for the year 2010 is 19%.

### Drinking water quality

Drinking water supplied by Pražské vodovody a kanalizace, a.s. for public consumption is safe and sound throughout whole Prague and its quality fully meets the requirements of the Decree No. 252/2004 Code of the Ministry of Health of the Czech Republic as amended by the Decree 187/2005 Code. The Decree is in compliance with the EU regulations and implements the Public Health Protection Act. Water quality is tested by accredited laboratories and the entire drinking water production and distribution process is under strict control. Drinking water from public mains is subject to more frequent quality controls and some of the parameters undergo stricter control than bottled water. Drinking water is tested for about one hundred different parameters.

In 2007 the PVK's laboratories monitored more than 83 000 different parameters in nearly 8,000 samples to ensure the good quality of water. More than 50% of the samples were taken from the Prague distribution system, the rest was coming from the Podolí, Želivka and Káraný Drinking Water Treatment Plants. In 2007 the distribution system was checked both along the distribution line (reservoirs, conduits) and at the consumers.

On the basis of the continuous monitoring of drinking water quality in the Prague distribution system we can say, with all responsibility, that the **quality of the drinking water supplied fully meets the European standards in respect of its physical, chemical, microbiological, and biological properties.**

## 7.2 Implemented measures

### Loss reduction, modernization

Reducing losses of drinking water in the distribution system is one of the long-term priorities of the PVS strategy concerning environmental aspects. The repair and modernization of the water supply system, together with its subdivision into separate supply zones continuously monitored for any leakage and the optimization of pressure conditions in the network, are the basic measures to reduce losses.

Ever larger amounts of money are spent each year on the maintenance of the water management infrastructure owned by the City. In 2007 in total of CZK 420 million, i.e. five times more than in 2002, was spent on the planned and accident repairs of the water supply system. The projects implemented in that year included, for example, the reconstruction of the

water mains in the Roman Blahník Street in Prague 5, in Cukrovarnická Street in Prague 6, and in Pařížská Street in Prague 1, and the reconstruction of the pressure zone 411 Holešovice in Prague 7, pressure zone 405 Vypich in Prague 6, and the renewal of the Káraný water mains in Prague 10. Other reconstruction projects were implemented in the Želivka treatment plant and in the Drinking Water Source Káraný. Reconstructions are implemented according to the approved plan and summary information about the implementation and costs is published each year in the Annual Reports of PVS, a.s.

One of the principal investors in the area of the completing the construction and reconstruction (modernization) of the water supply infrastructure on the territory of the City is the Department Investments of the Prague City Hall (OMI MHMP). The most important project in the last decade has been the reconstruction of the Podolí Drinking Water Treatment Plant. For a number of years the construction of pipe tunnels has been in progress in the Prague historical centre, in which water mains are placed alongside other utility networks. Most houses in the City centre are connected to those mains. In 2008 the construction of the pipe tunnel in Vodičkova Street with branches to V Jámě and Palackého Streets was completed. Currently the construction of the pipe tunnel underneath Wenceslas Square is running with the right-hand-side line "B" to be completed in 2009 and the left-hand-side line "C" in 2010, respectively. In 2010 the construction of the Hlávkův Bridge pipe tunnel is planned. The structure will provide another interconnection between the water supply systems on the left and the right banks of the Vltava River.

The OMI MHMP represents the Capital City of Prague at the completion of the water supply systems in the suburban City Districts (MČ). Its other responsibility is the construction and reconstruction of water mains and their connection to form circuits. The largest investment projects were implemented in District Prague 16 (Radotín), Prague-Čakovice, and Prague 20 (Horní Počernice).

### **Water supply and consumption metering**

The authority responsible for the actual supply of drinking water and the metering of its consumption is the company of Pražské vodovody a kanalizace, a.s. (PVK, a.s.). Practically all water supply (more than 99.8%) is metered by customer water meters (see above).

### **Information and awareness**

The company of PVK, a.s. has a detailed developed information system aimed at making the communication with customers and the Prague population most efficient. The company has good and regular relations with the national media (TV, radio), Internet servers (iHNed, etc.), and with papers of respective Prague City Districts. In its publicity and marketing events the company focuses on raising people's awareness about the quality of drinking water from the tap, on the beneficial effect of water on their health, etc. The company also participates in campaigns for the economic use of water, and for this purpose it has prepared and issued an information leaflet entitled "How and why to save tap water", in which it draws consumers' attention to leakages in households and gives them advice on how to save water. People living in Prague can find more information on PVK's web site ([www.pvk.cz](http://www.pvk.cz)).

As regards operational information, much attention is paid to informing the public about water loss reduction, methods of surveying water supply and sewerage systems, spotting hidden water leakages, etc. This kind of information is made available mainly through the

media, the company arranges excursions and interviews for journalists with specialists dealing with the water loss reduction. Information concerning the water loss reduction is also available on PVK's web site, in the magazine for customers, "Water for You", mailed to every Prague household twice a year, and in the PVK Annual Report.

All the issues mentioned above are regularly published in "PVK's company internal magazine, "Pévěkáčko", and on the Internet, as the company deems it necessary to keep its employees informed in detail about everything so that they can disseminate the information further.

### **7.3 Objectives and planned measures**

#### **General Water Supply Plan for the Capital City of Prague**

The city's principal document laying down the concept of supplying the Capital City of Prague with drinking and industrial water is the General Water Supply Plan. The General Plan sets out the main lines for the development of the City water-supply engineering system and is one of the supporting documents for the implementation of the Water Supply System and Sewerage System Development Plan of the Capital City of Prague and for the Land Use Plan of the Capital City of Prague. For time and financial reasons the whole project was been subdivided into two basic phases – the Conceptual Phase and the Detailed Phase. In the framework of the Conceptual Phase (2001-2003) the Concept Model of the Distribution System and other follow-up documents were prepared. In 2005, the implementation began of the projects proposed of the Detailed Phase.

The aim of the Detailed Phase was to propose adjustments to supply zone boundaries for existing conditions and the physical development in the framework of the current Land Use Plan of the Capital City of Prague taking into account approved changes. The new supply zone boundaries were drafted with regard to the optimization of pressure conditions in the water supply system and the optimum use of the existing water reservoirs and pump stations. The adjustments of the supply zone boundaries were made so as to cover all development areas intended for construction and to optimize residence time and the pressure conditions in the water supply system.

At the same time the concept was proposed of the water supply system development, the capacity of the existing water supply system for future needs was assessed and the parameters, lines, and the method and schedule for the reconstruction and completion of the water supply system over the entire area were determined. The project contained an analysis of requirements for extinguishing water supply and the water supply system was assessed from the fire safety point of view.

In 2006 the General Water Supply Plan, Detailed Phase, was prepared and implemented for Hlubočepy and Holyně Districts. In 2007 the Plan was implemented for Prague South-Eastern Districts.

The following is the plan for the completion and implementation of the General Water Supply Plan for the Capital City of Prague, Detailed Phase, for further City Districts.

<b>Expected implementation</b>	<b>Areas covered by the General Water Supply Plan, Detailed Phase of the Capital City of Prague (districts of the city)</b>
2009	Podolí, Michle, Nusle, Krč, Bráník; Smíchov
2010	Modřany, Komořany, Libuš; Chodov, Háje
2011	Prague's northern districts
2012	Radlice, Košíře, Jinonice
2013	Přední Kopanina, Nebušice, Lysolaje, Suchdol
2014	Zličín, Řepy, Motol
2015	Zadní Kopanina, Radotín, Lipence

### Further concepts

The General Water Supply Plan of the Capital City of Prague and the General Drainage Plan of the Capital City of Prague are basic conceptual documents for the supply of drinking water, the discharge and treatment of waste water, and rain water management. On the basis of an objective assessment of the initial conditions and the City expected development needs they make it possible for the authorities concerned to ensure the required extent and quality of the municipal water management services under Prague conditions. Other conceptual documents of the company of PVS, a.s. are:

- Plan for the Development of Water Supply and Sewerage Systems of the Capital City of Prague.  
It is based on the General Plans, while taking into account requirements in connection with the Czech Republic accession to the EU. The document was updated in 2007. Its part is a survey of investments into the water management infrastructure.
- Medium-term Investment Plan (MTIP).  
Each year the plan defines material and financial requirements for the reconstruction and completion of water management systems for five years ahead.
- Plan of the Water Supply and Sewerage Systems Reconstruction Financing.  
The company of PVS prepares the plan for the 10 year period in compliance with other planning documents. The plan is to be completed in mid-2008 and submitted to the authorities of the Prague City Hall authorities for approval. The obligation to prepare and implement the Plan for the Reconstruction of Water Supply and Sewerage Systems, as required by the Water Supply and Sewerage Systems Act, is intended to help implement the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

All the conceptual documents mentioned above have been prepared so as to link together and to complement each other:

## 7.4 Documentation

Prague Water Management Company (PVS)

- General Water Supply Plan of the Capital City of Prague

- General Drainage Plan of the Capital City of Prague
- Plan for the Water Supply and Sewerage Systems Development of the Capital City of Prague
- Medium-Term Investments Plan (MTIP)
- Plan of the Water Supply and Sewerage Systems Reconstruction Financing
- Strategy of Prague Water Management Company, till 2013
- Annual Reports of PVS a.s.
- Web sites: [www.pvs.cz](http://www.pvs.cz)

Prague Water Supply and Sewerage Company (PVK), member of Veolia Voda Group

- Annual Reports of PVK
- Web sites: [www.pvk.cz](http://www.pvk.cz)
- Customer magazine Water for You (Voda pro Vás)

Prague City Hall

- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)

## 8. Waste water treatment

### 8.1 Present situation and development, indicators

#### Waste water discharge and treatment

The central sewerage system was established in Prague at the beginning of the last century as a unified system discharging both urban wastewater and rainwater by common sewerage pipelines. New housing estates at the outskirts of Prague have separate systems, which do not mix waste water and rainwater and take them off them separately. The housing estates have the wastewater systems connected to the main sewers of the unified central system. The system takes waste water to the Central Waste Water Treatment Plant (CWWTP) on the Císařský Island in Bubeneč neighbourhood, where about 95% of waste water produced on the Prague territory is treated. Besides the CWWTP, there are other 21 local waste water treatment plants (WWTPs) in Prague, which treat waste water produced in the different districts, and another two plants treating waste water from the Ruzyně Airport. The total length of the sewerage system is 3 624 km.

The principal legal regulation of water management in the Czech Republic is the Act No. 254/2001 Code on water and the amending certain acts (hereinafter referred to as the Water Act), which became effective on 1 January 2002 and which is harmonised with the Council Directive 91/271/EEC of 21 May 1991 on treatment of urban waste water. Acceptable pollution values for the discharge of waste water into water courses are laid down in the Order of the Government of the Czech Republic No. 61/2003 Code on indicators and values of the acceptable pollution of surface water and waste water, detailed requirements for the issuing of the permit to discharge waste water into surface water and sewerage systems, and on sensitive areas.

The permit to discharge effluent from the CWWTP Prague was issued in 2000, still under the Order of the Government of the Czech Republic No. 82/1999 Code, and was prolonged in 2005 in accordance with the Act No. 254/2001 Code. The permitted limits therefore do not comply with those set out by the existing Order of the Government of the Czech Republic No. 61/2003 Code, whose values will be applicable as of 1 January 2011. Until 2002, the CWWTP had troubles with observing the Order, especially concerning nitrogenous pollution indicators; after that the problems were only exceptional (e.g. in the case of a contaminant inflow). To improve the situation, the Prague City Hall is preparing a project called "Total retrofitting and expansion of the CWWTP Prague on the Císařský Island).

**In 2007, the volume of waste water treated in Prague in accordance with the EU directive therefore accounted for approx. 5.5%.** The value corresponds to the amount of waste water treated in local waste water treatment plants.

**All waste water treated in the CWWTP and the local treatment plants is discharged into water courses, and the treated waste water is not reused.**

**Altogether 1.18 million inhabitants, that is approx. 99% of the total Prague population, are connected to the sewerage system.**

The total waste water production has been showing a declining trend, which partly reflects lower consumption of drinking water. The values for the CWWTP are shown in the following table:

	Q	
	m <sup>3</sup> /year	m <sup>3</sup> /s
1996	183 937 000	5.83
1997	170 190 100	5.40
1998	154 203 200	4.89
1999	150 482 750	4.77
2000	143 208 000	4.54
2001	147 590 750	4.68
2002	127 243 950	4.03
2003	128 069 600	4.06
2004	125 423 675	3.98
2005	119 639 112	3.79
2006	119 632 250	3.79
2007	114 454 962	3.63

The following are pollution values of the treated effluent discharged from the CWWTP and the treatment efficiency values in 1996, 2000, and 2007.

	Q '000 m <sup>3</sup> /year	BOD <sub>5</sub>		COD		Insoluble matter		N-NH <sub>4</sub> t/year	P <sub>c</sub>		N <sub>inorg</sub> t/year	N <sub>c</sub>	
		t/year	eff.	t/year	eff.	t/year	eff.		t/year	eff.		t/year	eff.
1996	183 937	12 800	61.5%	32 830	59.6%	16 640	66.3%	3 006	557				
2000	143 208	1 594	94.2%	9 088	87.9%	3 572	93.4%	1 619	247				
2007	114 454	600	97.8%	4 214	94.2%	885	97.9%	469	73	89.9%	1 802	2 124	66.3%

## 8.2 Implemented measures

**The Central Waste Water Treatment Plant Prague** was built in the second half of the 1960s. In later years it underwent two large reconstructions and was expanded several times. The first reconstruction took place in the early 1980s (1981-85) and the second in the middle of the 1990s (1994-97). After the two reconstructions, the quality of the treated water improved radically. In August 2002, the whole CWWTP structure was flooded. Thanks to the extreme efforts of the operator and sufficient financial means it became fully operational as early as in December of the same year.

Immediately after the 2002 flooding, all the CWWTP's machinery equipment was repaired, but with only a few exceptions this did not mean any reconstruction that would increase the plant throughput. In spite of this, quality of the treated water moderately improved between 2003 and 2005, and since then it has remained on virtually the same level. Partial investments were made in the CWWTP in the past ten years. These investments, however, were not of a size to significantly improve the treated water quality. The measures taken in that period were intended to mitigate the adverse impacts of the CWWTP's operation on the population (noise nuisance reduction and suppression of the bad smell from sludge and gas management). Only the most urgent replacements and reconstructions of physically or morally obsolete pieces of equipment have been carried out in the CWWTP in the past few years to keep the plant under operation.

**Local waste water treatment plants** treat waste water from suburban localities, which are not connected to the Prague central sewerage system. They are plants serving population equivalents from ten to fifteen thousands. Most of the treatment plants were originally built as municipal treatment plants, which gradually became the property of the Prague City Hall. The plants are gradually undergoing retrofits so as to meet the steadily growing demands concerning the volume and quality of treated water.

Twelve local waste water treatment plants (Březiněves, Čertousy, Dolní Chabry, Kbely, Kolovraty, Královice, Miškovice, Nebušice, Sobín, Újezd nad Lesy, Vinoř, and Zbraslav) of the total number of 22 have been retrofitted in the last ten years. Another five plants have been built (Holyně, Koloděje, Lochkov, Svěpravice, and Újezd u Průhonic). Half of the projects have been implemented during the last five years. Currently preparations are in progress for the reconstruction of the waste water treatment plants in Klánovice, Nedvězí, Svěpravice, and Uhřetěves and for the expansion of the treatment plants in Miškovice and Vinoř). Most of the treatment plants currently under operation are provided with automatic control systems connected to the central control room, which guarantees high treatment efficiency.

All local treatment plants meet water management limits in accordance with the European directive on urban waste water (91/271EEC). All treated water is discharged into the nearby water courses and treated water is not immediately reused.

Investment construction and the repair of the sewerage system is the responsibility of PVS, a.s., as in the case of the repair and reconstruction of the water supply system (see previous chapter). Another representative of the investor charged with the construction and reconstruction of the sewerage system is the Department of the City Investor of the Prague City Hall (OMI MHMP). The projects are based on planning documents taking into account operational needs in the case of accidents. In 2007, investments in the construction of the water management infrastructure amounted to CZK 1 197 million (sewerage and water supply systems). The most important projects in the sewage management included the reconstruction of the sewerage lines in Revoluční Street and Na Františku Street in Prague 1, reconstruction of the Radlice main sewer in Prague 5, and reconstruction of the sewerage lines in Bártlova Street in Prague 20. In the last few years, repairs of the water supply system in the property of the Capital City of Prague carried out by PVS a.s. cost approximately CZK 200 million.

The most important investment projects carried out by the OMI MHMP in sewerage systems in the last five years were the completion and reconstruction of main sewers in the Prague suburban districts. They include the construction of the complete coverage sewage systems in the Prague-Slivenec, Zličín, Kbely, Zbraslav, Kunratice, Kolovraty, Nebušice, Radotín, Řeporyje, Suchdol, Lysolaje, Čakovice, Satalice, Újezd nad Lesy, Dubeč, and Horní Počernice Districts. Each year, the Capital City of Prague invested between CZK 800-1300 million into these projects. In addition to the aforementioned projects the OMI MHMP carried out the reconstruction and intensification of the waste water treatment plant in Újezd nad Lesy and the construction of the A2 sewer in Modřany was started.

### **8.3 Objectives and planned measures**

#### **General Drainage Plan of the Capital City of Prague**

The General Drainage Plan is the basic conceptual document of the City of Prague in the area of the waste water discharge and treatment and the taking off rainwater. The City other



conceptual documents concerning the development of the water management infrastructure were mentioned in Chapter 7. Water Consumption.

The General Plan sets out the main directions of the City drainage system development. It proposes several options, including their technical, economic, and environmental impacts. This concept is an instrument intended to facilitate control and decision-making processes in the servicing and development of the City drainage system making it possible to act operatively and systematically in carrying out the planned investment projects. The Plan comprises the investment plan and a flood control proposal to protect the sewage systems. After completing of the 1<sup>st</sup> phase of the General Drainage Plan in 2001, PVS started to work on the 2<sup>nd</sup> detailed phase dealing in detail with the drainage of respective partial areas.

The major activities of the continuous updating and administration of the General Drainage Plan are updating and completing of situation reports, maintaining and completing the data base, and updating the simulation drainage models, recalculating new options and strategies for the drainage subsystems, and preparing documents for the investment and decision-making activities of PVS and the City bodies and organizations.

### **Central Waste Water Treatment Plant (CWWTP)**

The preparations for the reconstruction of **Central Waste Water Treatment Plant Prague** on the Císařský Island, which started forty years ago, are nearing its completion. In the last few years, lengthy discussions have taken place with civil initiatives and the City Districts concerned, which delayed the issue of the land-use permit. The inhabitants feel very sensitive about the connection of the new part of the structure and its operation to both banks of the Vltava River in Troja and Bubeneč. At present the solution is adopted when the technology line will be hidden from the public view into the greenery following from the premises of the Royal Game Preserve Stromovka and the Troja Chateaux and the Prague ZOO. It was managed to adjust the technology of the waste water treatment requirements to conditions of the City flood control measures and at the same time to keep the entire premises as a part of the public recreation area.

Equally sensitive is the solution of the retrofitting of the existing technology units, especially as regards the sludge management and the sludge transport after treatment. The ultimate state of the whole sludge line is to remove this facility outside the City, in accordance with the Land Use Plan of the Central Bohemia Region. The fluid sludge transport is implemented in pipelines located in the shaft conduit. The sludge will be then treated to serve as a renewable energy source.

The total target capacity of the plant is 1 650 000 p.e., The objective is to treat waste water to the level complying with Council Directive 91/271/EEC and Czech regulations on the discharge of waste water into surface water. The project is divided into several stages and shall be completed by the retrofitting of the sludge management. The project is estimated to cost CZK 18.1 billion. When completed and put under operation in 2012, the City troubles with waste water disposal and the removal of nitrogen and phosphorus will be solved. In the next period the sludge management issues shall be solved.

## **8.4 Documentation**

Prague Water Management Authority (PVS)

- General Drainage Plan of the Capital City of Prague

- Plan for the Development of Water Supply and Sewerage Systems in the Capital City of Prague
- Medium-term Investment Plan (MTIP)
- Plan of financing of the reconstruction of water supply and sewerage systems
- Strategy of the Prague Water Management Authority until 2013
- Annual reports of the Prague Water Management Authority
- Web sites [www.pvs.cz](http://www.pvs.cz)

Prague Water Supply and Sewerage Company (PVK), member of the Veolia Water Group

- Annual reports of PVK
- Web sites [www.pvk.cz](http://www.pvk.cz)
- Customer magazine Water for You (Voda pro Vás)

Prague City Hall

- Construction of technical equipment of selected City Districts in OMI MHMP structures (Department of the City Investments and ZAVOS company)
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)

## 9. Environmental management of the municipality

### 9.1 Present situation and development, indicators

#### ISO 14001 / EMAS Certification

In Prague public administration is performed both at the citywide level (the Capital City of Prague, the Prague City Hall) and at the level of city districts (57 self-governing City Districts, the City Districts Authorities, of which 22 have a specific role as regards performance of the state delegated powers). An administrative support is provided at both the levels by respective authorities (the Prague City Hall, the City District Authorities). The Capital City of Prague as well as the City Districts are the founders of a number of organisations (schools, organisations of social care, of culture, of municipal services, professional facilities of the City, etc.). Certain organisations are joint stock companies with investments from the City; other private organisations are important City suppliers (of services, energy services, water management, transport, etc.).

Directly at the City authorities the ISO 14001 and EMAS Certification Systems are not yet much applied. Some City Districts are only planning to get ISO 14001 Certificate (e. g. the City District Prague 4, the City District Prague – Letňany). However, the ISO 14001 Certificate is applied in organisations with the City investments. Among the most important ones there are e. g. the following:

- Pražská energetika, a. s. (joint stock company of Prague Energy Utility Co.);
- Pražská plynárenská, a. s. (joint stock company of Prague Gas Utility Co.);
- Pražská teplárenská, a. s. (joint stock company of Prague Heat Utility Co.);
- Pražské služby, a. s. (joint stock company of Prague Services Co.)
- Pražská vodohospodářská společnost a. s. (joint stock company of Prague Water Management Co.)

About 170 other organisations having registered offices in Prague hold ISO 14001 Certificate. The following can be mentioned in relation to the City issues, for instance:

- IPODEC, ASP služby Services, AVE CZ, A.S.A. KOMWAG (waste management);
- Joint stock companies of Metroprojekt Praha, a. s., Metrostav, a. s., Hydroprojekt a. s., Chemoprojekt, a. s., and others (projection, construction works);
- Telefónica O2 (telecommunications).

The EMAS scheme (Eco-Management and Audit Scheme) is less spread in the Czech Republic than ISO 14001. The Ministry of the Environment of the Czech Republic is the national guarantee of the EMAS Programme; CENIA, the Czech Information Agency of the Environment, provides for the role of the EMAS Agency. According to the CENIA national records, 42 Czech organisations hold the EMAS Certificate, among others e. g. a joint stock company of Metrostav, a. s. However, not a single public authority subject has yet been registered.

In the certification system, the cities and municipalities, and their authorities concentrate rather on the line of ISA 9001 certificates and the CAF instruments. In Prague several authorities hold ISO 9001 Certificate (e. g. City District Prague 5, City District Prague 10, City District Prague 11, and City District Prague 14) and others are preparing for it (in the

closest years e. g. the City District Prague 4, City District Prague 13 or City District Prague Letňany).

### **Consumption of environmentally friendly products**

In order to be environmentally friendly, the City authorities and their organisations implement certain measures, such as:

- requirements for the ISO Certification of the City suppliers (especially as regards the environment);
- sorting of waste in offices and in municipal authorities buildings;
- purchase of office and sanitary needs made of recycled materials;
- purchase of environmentally friendly cleaning agents;
- toner and copying equipment recycling; and
- purchase of low-energy electrical appliances, etc.

Implementing of these measures is voluntary at the level of City Districts (except for sorting of waste required by law) and is based on strategies and policies of the respective City Districts and their authorities. It is neither systematically managed nor registered from the centre. More likely one time awareness building events and surveys take place. Detailed or quantified data on the environmentally friendly products consumption are not yet available.

### **Energy consumption in the buildings of the City**

Information on the implementation of energy saving measures in buildings owned by and its City Districts in accordance with the Action Plan of the Territorial Energy Concept of the Capital City of Prague is given in Chapter 1 Local contribution to climate change.

**In buildings owned by the Capital City of Prague the specific energy consumption ranges from 0.4 to 0.7 GJ/m<sup>2</sup>.**

## **9.2 Implemented measures**

Once the democratic regime was restored in 1989, the Capital City of Prague has devoted itself to improving the quality of the environment and to sustainable development of the City. The issue became an integrated part of the basic planning documentation for the development of the City: the Strategic Development Plan of the Capital City of Prague, the Land Use Development Plan of the Capital City of Prague, and further it is repeatedly developed as concrete objectives of programming documents of the political management of the City: e. g. in the Programming Declaration of the Prague City Council called *City for Life* for the period of 2006 – 2010 (and the previous ones). The conceptual documentation for the respective thematic fields of environmental issues have been developed, e. g. for air pollution control, water management, nature conservation and landscape protection, waste management, energy industry and consumption, noise, environmental education and awareness, etc. These concepts are, by means of consequent action plans, gradually implemented. The necessary administrative structures that provide for implementation of the measures and agenda pertaining to the environment in accordance with the objectives of the self-government as well as legal requirements (including EIA and IPPC) were established and effectively transformed at the level of the Prague City Hall and the City District Authorities. The state of the environment and the related factors are continuously monitored, information is processed and regularly presented by means of the Environment Information System of the Capital City

of Prague and its outputs dedicated to professionals and the public, e. g. in comprehensive reports / Yearbooks Prague – the Environment.

As regards the environmental management, so far it has been partially applied in the City offices. At more it is applied in organisations with the investments of the City and in organisations cooperating with the City (see the previous section). The Capital City of Prague provides for basic education and promoting.

In some City Districts the Local Agenda 21 (LA21) is implemented. For example, the City District Prague 7 has declared its support to LA21 since 2003, the City District Prague – Libuš since 2004, the City District Prague 10 and Prague 13 since 2007. Other City Districts consider the LA21 introduction. The Local Agenda 21 is supported by the Ministry of the Interior of the Czech Republic and since 2006 it has been incorporated into official methods for the quality improvement in public administration. The non-governmental organisations cooperating with or associating cities and regions in the Czech Republic (e.g. the National Network of Healthy Cities of the Czech Republic, TIMUR – the issues of indicators) also give the LA21 targeted attention.

As regards the reduction in energy consumption in the buildings owned by the Capital City of Prague and its City Districts, implementation of saving measures proposed in energy audits in compliance with the Action Plan of the Territorial Energy Concept of the Capital City of Prague (see Chapter 1) was commenced.

### 9.3 Objectives and planned measures

The basic sustainable city development concept is generally defined as one of the five main priorities of the Strategic Plan of the Capital City of Prague. It is a long-term conceptual document determining the strategic vision, objectives, priorities, and ways to finding solution to crucial issues of the City development over the period of 15 to 20 years. It was developed and approved in the year 2000. Each time, a monitoring report on fulfilling the strategic concept for a certain period is processed. At present the Strategic Plan of the Capital City of Prague is being updated. The environmental priority is laid down in the following wording: The Attractive and Sustainable City (The quality of the environment). “Prague strives for achieving the high quality natural and urban environment while respecting principles of sustainable development. It endeavours after fundamental cut down in the environmental load and after achieving balance between the residential structures and the landscape so that it becomes a clean, healthy and harmonic city.

#### **Strategic objectives of the Priority “Attractive and Sustainable City” in the Strategic Plan of the Capital City of Prague**

P 1 Gradual improvement of quality of all environmental compartments on the territory of the Capital City of Prague

- P 1.1 Reduce air pollution to be at the hygiene acceptable level
- P 1.2 Improve quality of surface water and groundwater
- P 1.3 Limit noise nuisance, namely in residential and recreational areas
- P 1.4 More consistently conserve, appropriately enlarge, and manage the City greenery
- P 1.5 Eliminate “visual” pollution

P 2 Sustainability of energy and material flows

- P 2.1 Minimize the amount of waste produced and maximize its recycling
- P 2.2 Limit production of untreated emissions and waste water
- P 2.3 Reduce the consumption of electricity, water, heating and transport fuel

- P 3 Sustainable harmony of the urban and natural environment
- P 3.1 Support stability of the urban and suburban landscape
  - P 3.2 Enlarge, or at least sustain, the current diversity of natural elements
  - P 3.3 Limit and appropriately regulate recreational use of the protected areas in the City
  - P 3.4 Conserve visual quality of views and panoramas in the Prague Valley
- P 4 The development of the City with respect to historical and cultural heritage
- P 4.1 Sensitively integrate ancient monuments and assemblies into the City livfe and operation
  - P 4.2 Conserve, or put the finishing touch, to the character of the individual parts of the City without damaging the genius loci of Prague, and particularly the Prague Historical Reserve Area
  - P 4.3 Disburden the historical centre
  - P 4.4 Engage the public into solutions of the City development issues

In accordance with the Agenda 21 the Strategic Plan of the Capital City of Prague also declares the necessity of employing sustainable development principles. All administrative units of the City authorities shall take part in fulfilling the strategic objectives.

The specific environmental management objectives and measures, or their introducing in authorities and organisations of the City, have not yet become a part of the approved conceptual documents of the Capital City of Prague. However, education and promotion of the systematic approach to introducing environmental management, Local Agenda 21, rising share of environmentally friendly products of total consumption, or informing the public and experience exchange on this topic shall continue. Activities shall be implemented both at the level of the Capital City of Prague and its Districts and in cooperation with respective ministries and cities in the Czech Republic, as well as with cities of the other EU countries (e.g. within cooperation under the EUROCITIES Environment Forum).

Implementation of energy-saving measures shall continue as well (see Chapter 1).

#### **9.4 Documentation**

- The Strategic Plan of the Capital City of Prague
- The Land Use Plan of the Residential Department of the Capital City of Prague
- CENIA documents and records ([www.cenia.cz](http://www.cenia.cz))
- Documentation of respective City Districts
- The Yearbook Prague Environment 2007 (and the previous ones)
- Web sites <http://envis.praha-mesto.cz> (the Environmental Information Service in Prague)

## 10. Sustainable land use

### 10.1 Present situation and development, indicators

The valid Land Use Plan of the Capital City of Prague specifies the anticipated new functional development of the plots that lost their original function and are expected to be newly used. The ambition of the Land Use Plan is to integrate the currently deprived and unused industrial, agricultural, transport or military lands into the urban body, thus creating more effective investment opportunities inside the City and reducing occupation of the so far undeveloped areas for new purposes.

Over the last few years, the so-called brownfields have been newly developed, especially in the City District Prague 5. There, a new peripheral City District centre with all-city functions has been built on the former machinery industry site of almost 7 hectares in area. As a pilot project of the land conversion, a multipurpose hall for 17 thousand spectators has been completed on the former ČKD sites in Vysočany neighbourhood; it was followed with projects of a shopping centre, sports and leisure time areas, business areas, and a housing estate. The whole territory has area of 21 hectares. The construction of commercial buildings on the Rohan Island is another already begun and partially executed rehabilitation of a deprived area by which the restoration of the Vltava River embankments have started. This restoration will lead to an establishment of a new, urban structure on the Rohan Island and on Maniny quarter in Prague 8. At this locality, 2.6 hectares have been reused so far out of the total 22 hectares.

The new housing estate built on the site of the former malt house in Prague 6 – Podbaba is 6 hectares in area.

**The share of the so far implemented brownfields transformation is only 2.2 % of the total territory determined to the new development; nevertheless, a major part of the whole 800 ha of the brownfield areas in Prague are of the investors' primary interest and projects of their new development are under preparation.**

The most important changes being prepared at the Prague brownfields are large areas of the former Prague – Bubny Railway Station, Žižkov Freight Station, former Libeň Wharfs, the territory of the former sugar refinery in Modřany and the ongoing transformation of Smíchov neighbourhood around the Smíchov Railway Station.

#### Population density in newly developed areas

The population density in newly developed residential areas varies a lot, especially with view to the character of the housing estate and the number of residents per an apartment. At newly built-up residential localities of housing estates in tenement houses the average density of a built-up area is around 200 to 300 inhabitants / ha, with 2 – 2.5 residents / apartment. At localities of family low-floor houses the average density is 50 – 150 inhabitants / ha, with 2.5 – 3.5 residents / apartment.

#### Commuting to work and school

The Czech Statistical Office has developed a detailed assessment of residents' commuting to work and schools by making evaluation of the results of the People, Apartments, and Houses Census (the Census) in 2001. The importance of labour mobility is more and more significant;

the number of those who commute is growing. Prague is the centre of the largest and most important labour micro-region in the Czech Republic. The largest volume of commuting to work and school is the commuting within the Capital City territory.

**In Prague, around 550 thousand inhabitants residing there commute to work and more than 150 thousand people arrive in there from other localities. Out of the total labour in Prague, more than one fifth live outside the Capital City as well as about one fourth of all pupils, students, and apprentices.**

Jobs are more likely located in the central City Districts where the main commuting streams go primarily from peripheral districts with prevailing residential function. Every fifth working resident of the total number of passengers travelling among Prague districts heads for the central City District Prague 1. Commuting inside the City as well as in its close vicinity is to an important extent affected by the transport quality, that means by the public city and suburban integrated transport system.

### **Total area, total population, the share of developed areas**

The City total area is 496.1 square kilometres. On the City territory the total population is 1.188 mil. citizens. **The population density in the whole City is approximately 2.4 thousand citizens per a square kilometre.** The highest population density is in the central part of the City – more than 10 thousand inhabitants per square kilometre in Districts of Prague 2 and Prague 3. Peripheral City Districts with important housing estates, e. g. Prague 17 or Prague 13 (western part of the City), or Prague 11 (South-East) also have a relatively high density (more than 3 thousand inhabitants per square kilometre). On the contrary, in majority of peripheral City Districts the population density is very low (less than 0.5 thousand inhabitants per square kilometre). Agricultural land prevails on the territory of the peripheral City Districts.

According to the records of the Real Estate Cadastre administered by the Czech Survey and Cadastre Authority (ČÚZK), on the City territory the number of developed areas has grown by 650 ha since 1990. At the same time, the agricultural land dropped by 800 ha. The share of the developed areas is currently 9.89 % of the total City area.

The following table gives the shares of various types of areas on the City territory in 1997, 2002, and 2006 (source: ČÚZK).

	<b>Agricultural land (%)</b>	<b>Forest land (%)</b>	<b>Water bodies (%)</b>	<b>Developed areas (%)</b>	<b>Other areas* (%)</b>
1997	43.04	9.81	2.15	9.29	35.77
2002	42.55	9.85	2.18	9.75	35.63
2006	41.90	10.00	2.17	9.89	36.03

*Note: The category "Other areas" also includes building sites.*

## **10.2 Implemented measures**

### **Minimization of the total area of the deprived and contaminated areas**

Within preparation for new projects, e.g. on the Rohan Island, in Maniny and Vysočany, the brownfields and deprived areas have been decontaminated and the land cleared; the areas devastated and contaminated by floods in 2002 have been treated and the environmental load have been removed. In the former industrial areas deprivations are being eliminated within the



upcoming or commenced transformations. Large volume of buildings under construction, especially the traffic constructions, brings in interim spoil mounds and depreciated areas; however, the final environmental rehabilitation and treatment of surroundings are obligatory parts of all constructions finished.

### **Urban territories under restoration**

Besides the new housing estates built on the greenfields, reconstruction of majority of important buildings has been accomplished. Urban areas have also been through major renovation. Some City centres, both peripheral and local, have been renewed, e.g. in Vysočany or Vinoř neighbourhoods. Vacant spaces in compact urban areas are filled with buildings. In the wider City centre there are only few incomplete concepts – they are the buildings under construction in Národní třída Str., in Smíchov, in Těšnov, and in Albertov.

### **Rise in population density on the urbanized territory**

Rise in population density on the urbanized territories eventuates not only from thickening of the housing estates with further buildings, completion of or appendices to and on the current buildings, but also from building of high capacity residential, office, or commercial buildings on the mixed areas. The large number of employees compensate for population losses caused by low birth-rates and a rise in number of single-man households. Another reason is the present trend of thickening of developed areas in the already existing urban structure.

## **10.3 Objectives and planned measures**

The basic long-term measure is the approved Principles of the Land Use Development Concept determining purposeful and territorial control grounded in the valid Land Use Plan of the Residential Authority of the Capital City of Prague, or in the final stage of the drafting of the new Land Use Plan. Other documents affecting sustainable development of the territory are the Principles of the Land Use Development of the Capital City of Prague and the Strategic Plan of the Capital City of Prague.

One of the components of the territorial preparation is the concept of the area conservation for the location of public welfare buildings and public welfare measures. For decisive intentions and plans a building ban can be imposed or its imposing can be considered as a conservation measure.

## **10.4 Documentation**

The City Development Authority of the Capital City of Prague:

- Land use analytical background documents of the Capital City of Prague (2008)
- Principles of the Land Use Development Concept of the Capital City of Prague (2007)
- Strategic Plan of the Capital City of Prague (updated 2008)
- Land Use Plan of the Residential Authority of the City of Prague (the plan has been valid since 1999, a concept of the new one is being drafted)
- Prague Railways (concept of the railway transport development – being drafted)

- Principles of the Pedestrian Transport Development and the General Plan of the Pedestrian Transport (being drafted, guaranteed by the Department of Transport of the Prague City Hall)
- Concept of the Nature Conservation and Landscape Protection (2007)

Czech Statistical Office

Czech Survey and Cadastre Authority

Prague City Hall

- The Yearbook Prague Environment 2007 (and the previous ones)

## 11. Other measures

### Strategy and planning

The Capital City of Prague has a systemic approach to environmental protection. Its basic strategic framework is formulated in the **Strategic Plan of the Capital City of Prague**, which sets out objectives, priorities, and approaches for addressing crucial issues of the city development for the period from 15 to 20 years. The Strategic Plan of 2000 is being currently updated. In accordance with the participation principles a public debate took place in August 2008 on the Environmental, Public Health and NATURA 2000 Localities Impact Assessment of the Update of the Strategic Plan of the Capital Prague.

Environmental issues have been balanced way incorporated in the **Land Use plan of the Residential Department of the Capital City of Prague** approved in 1999. Changes to the land use plan are prepared in accordance with the Building Act and the particular decision of the Council of the Assembly of the capital City of Prague taking into account the requirements of the City Districts and the interests of investors and land lords. An important aspect in the preparation of the land use planning documents is environmental protection. The Land Use Plan of the Capital City of Prague encompasses elements of the **Territorial Environmental Stability System** (bio-centres, bio-corridors, interactive elements).

Prague has a number of **conceptual documents prepared for respective environmental care areas** (e.g. air quality control, water management, nature conservation and landscape protection, waste management, energy industry and consumption, noise nuisance, environmental education and bring-up, etc.). Information on these subjects can be found in the corresponding chapters of this document.

The objectives and priorities in the field of environmental protection and sustainable development are repeatedly declared by the City's political leadership in their programme documents. Currently the document concerned is the **Programme Statement of the City Council of the Capital City of Prague for 2006-2010** (for more details see Chapter 9).

### EIA and IPPC instruments

Instruments of the **Environmental Impact Assessment (EIA)** and **Integrated Pollution Prevention and Control (IPPC)** are implemented within the City administration.

According to the Act No. 100/2001 Code on Environmental Impact Assessment in its valid wording plans (project EIA) and concepts (strategic EIA), the implementation of which could have a serious impact on the environment, are subject to environmental impact assessment. The body responsible for this work is the Prague City Hall (MHMP) in co-operation with other authorities (Ministry of the Environment of the Czech Republic). Between January 2002 and August 2007, the MHMP received 465 notifications. The City informs the public about EIA activities on its websites and in the Yearbooks - Prague Environment.

The Act No. 76/2002 Code on integrated pollution prevention and control, on the Integrated Pollution Register and amending certain acts (Integrated Prevention Act), became effective on 1 January 2003. In the subsequent years the Act and its implementing decrees were amended. According to the OOP MHMP, there are approximately 30 existing facilities on the territory of the City of Prague established in accordance with Appendix No. 1 to the Act No.

76/2002 Code. Fourteen valid integrated permits were issued by the end of 2006 since the Act became effective.

### **Nature conservation**

Prague is unique in terms of the abundant number of nature-close localities, biotopes, places where human activities have not been too negative so far. Prague's nature and landscape provide the necessary living space for a whole number of species of flora and fauna, including protected ones. There are numerous localities of different level of protection on the territory of the City of Prague as follows: **88 specially protected areas** (4% of the City area) and **11 nature parks** (20% of the City area). There are also **86 memorable trees** registered in Prague, which are subject to special protection. More information can be found in Chapter 3 and in the Yearbook Prague - Environment.

### **Flood control measures**

Prague went through historic experience during the 2002 flood. The aftermaths of the flood in the centre of Prague were significantly mitigated thanks to the partially completed **flood control system** (system of mobile flood control walls). Its construction began as early as in 1997. Original concept was designed for the size of flood occurring once in one hundred years. The 2002 floods, however, were classified as one occurring once in 500 years. On the basis of the experience gained during the 2002 flood, mathematical models and other background materials, additional and innovated measures have been designed to provide much better protection to Prague. The implementation of further phases of the flood control system has been undergoing.

### **Environmental education and awareness**

The Capital City of Prague has been developing a system of **Environmental education and awareness (EVVO)**, the purpose of which is to make people to acquire knowledge, skills, and habits, accept the hierarchy of values and the life style needed for the environmental protection in the sense of ensuring sustainable development at the local and global levels. It places emphasis on direct contacts with nature and with practice, on comprehensive knowledge, the use of the latest findings and local specifics. The EVVO is focused on the entire population, which is subdivided, according to specific aims and means, into 3 main target groups as follows: public administration officials, children and the youth, the business sector, and the general (lay) public, which is further divided into target subgroups according to specific objectives and operating means. Special emphasis is placed on the EVVO in children and the youth as people's life attitudes and habits are shaped at the early age.

In 2002 the Council of the Capital City of Prague approved the objectives and major tasks of the EVVO on the territory of the Capital City of Prague, in compliance with the State EVVO Programme of the Czech Republic. Another document is the Regional Concept of Environmental Education and Awareness on the territory of the Capital City of Prague for 2005-2015 approved in 2005. The Council of the Capital City of Prague in August 2006 approved the Action Plan for the Regional EVVO Concept of the City of Capital Prague as a Region Developed as a follow-up to the Concept.

Several workplaces participate in the EVVO implementation. Its management has been entrusted to the EVVO coordinator, a new post created at the Prague City Hall. Partial activities are the responsibility of the departments of protection, education and informatics, respectively, as for instance: the grant programme for environmental protection, nature trails, information campaigns and materials, education events and the participation of schools, the

Prague Environment Information System – websites, the Atlas, yearbooks, CD, ATEM, and PREMIS projects, noise maps, etc.

### Information on environmental quality in Prague

The Capital City of Prague has a long tradition in processing and providing information on the environment.

The Environment Information System (IOŽIP) collects and processes data on selected environmental compartments on the territory of the Capital City of Prague. The aim of the System is:

- collecting and processing of data on state of respective environmental factors in Prague that are carried out by different organisations;
- evaluation of available data and initiation of data collection in fields where no other source exist;
- informing the City administration bodies, experts, and the public.

The beginnings of the Prague Environment Information System go back to the mid-1980s, when it was developed as one of the thematic areas of the City Information System. Since then it has undergone several organizational and technological changes. Since 2000 the operation and development of the System has been the responsibility of the Department of Informatics of the Prague City Hall.

The **Yearbook - Prague Environment** published regularly since 1989, later (since 1992) also in English and in electronic form has become the best-known outcome of the System. The current structure of the published information was introduced in 2000. Seven **CDs/DVDs Prague Environment** have been published since 1997, each of which includes the latest Yearbook, the Atlas of the Environment, the Numeri Pragenses statistical yearbook (from the Czech Statistical Office), and other specialized publications concerning air quality (REZZO, ATEM), nature conservation (Vegetation map, Birds, Butterflies, Protected areas), noise maps of Prague, data and information sources (ÚEP), etc.

The system development is guided by efforts to keep up with the rapid development of information technologies, including GIS and the Internet. A set of the Yearbooks, the **Atlas of the Environment** – maps as an interactive application of GIS ([www.premis.cz/atlaszp](http://www.premis.cz/atlaszp), [www.wmap.cz/atlaszp](http://www.wmap.cz/atlaszp)), and other publications have been presented at the City websites. Since 2002 the **Internet server, ENVIS** ([envis.praha-mesto.cz](http://envis.praha-mesto.cz)) has been under operation that integrates previously separately designed applications to provide information on the environment in Prague (facts and figures from the Yearbooks, information provided by the MHMP departments, maps, databases, air quality monitoring, news, references, etc.).

Today the IOŽIP System is taken as a broader set of activities linking up with other projects in the field of environmental informatics. Some of these projects are managed by the Department of Informatics of the Prague City Hall in co-operation with the other departments of the Prague City Hall, such as the **PREMIS Project** (making public available operative data on air quality, hydrological and meteorological conditions, and other information – notices and warnings – by the Czech Hydrometeorological Institute on the Internet([www.premis.cz](http://www.premis.cz)), the **ATEM Project** – air quality assessment with the use of model calculations, the **REZZO Project** – updating and administration of Air Pollution Sources Inventory, **noise maps**, etc. These projects include data and technology relations and the outputs are presented both in the Yearbook and the Atlas of the Environment.

The IOŽIP systems and products, such as the Atlas of the Environment, have won recognition at home (e.g. in the competition Geoapplication of the Year, CAGI) and also internationally

(best practice in the ENWAP and CAPE publications of the European Commission, the HABITAT Best Practices Hub database, etc.). In June 2003 the ENVIS server was awarded the third rank in the international competition of environmental websites (UNEP/GRID).

### **International co-operation**

Prague has joined **international co-operation projects in the area of the environment**. The City is an active member of the **EUROCITIES Environment Forum** network, the Union of the Capitals of the European Union (UCEU), the Organisation of World Heritage Cities (OWHC), the POLIS (association concentrated on transport issues), etc.

Prague has been and is repeatedly a regular member of international teams addressing projects. The City has namely participated in teams tackling issues in the area of environmental informatics. In 1999 Prague participated in the **Cities Environment Reports on the Internet (CEROI) Project** (the UNEP Programme, coordinated by GRID-Arendal). Prague, together with other cities, has prepared a pilot presentation according to a defined methodology. From 2000 to 2002 Prague participated in the EU projects in the area of environmental informatics – **INTERACT** (Interactive Services and Management Support for Environment Impact Assessment and Permitting Procedures), and **HEAVEN** (Healthier Environment through Abatement of Vehicle Emission and Noise). Both projects were addressed as part of the 5<sup>th</sup> Framework Programme. In the last few years Prague has cooperated with other EU cities on the preparation of other projects in the thematic areas of informatics, environment, land use planning, transport, etc. (e.g. **AIR4EU – Air For Europe, CITEAIR, INTEL CITY, INSPIRE, SURE, BOOCLA**).

In 2006 and 2007 Prague participated in the international project of **Urban Ecosystem Europe** along with other 25 and 32 European cities (in 2007), respectively. The project outcome was publications comparing the environment and environmental policy by means of a set of indicators. Prague also participated in the preparation of the publication of **Our Clean Cities** - best practice booklet, which comprised 22 best practice examples from European cities – members of the Eurocities network.

The responsible representative of the Capital City of Prague (RNDr. M. Gregar) participated on 15 May 2006 in the conference in Tallin, Estonia. He added his signature, as the Councillor that time responsible for the environment, to the declaration establishing the initiative of the **European Green Capital**. The decision of the Council of the Capital City of Prague on the participation in the competition of the European Green Capital Award, called on in May 2008, is merely the logical continuation thereof.

## 12. Programme for dissemination of experiences and best practises

Prague views its participation in the European Green Capital Award competition as an exceptional opportunity for experience exchange and for intensifying contacts with other European cities, as well as giving publicity to its own long-term efforts in environmental management and for sustainable development. Prague is prepared to participate actively in the exchange of experience and to co-operate with other cities, not only those taking part in the competition.

The following activities are realistic in the event of the success and of winning a prize in the European Green Capital Award competition:

- creation and administration of websites devoted to the competition;
- organisation of at least one conference on the competition issues (opening conference, closing ceremony), possibly other workshops related to environmental issues;
- creation of exhibition panels for the Capital City of Prague, placing the moving exhibition in the City's representative premises;
- creation of materials for a best practices publication within the framework of the competition, its issue (in the Czech and English versions);
- ensuring co-operation with other Czech cities and the Union of Towns and Municipalities of the Czech Republic in promoting the competition and its methodology;
- ensuring co-operation with ministries of the Czech Republic and with organisations dealing with environmental issues at the national level (Ministry of the Environment of the Czech Republic, CENIA Agency, Czech Hydrometeorological Institute, etc.), and further co-operation with universities (Charles University in Prague) and non-governmental organisations;
- ensuring its promotion and co-operation with the media;
- other activities within its financial and capacity limits and dealing with the organisers of the competition.

In order to ensure the implementation of aforementioned activities Prague is prepared to develop the multisource financing model, i.e. to seek support from the EU funds and from partners in the private sector, in addition to using funds from its own budget. The extent of the activities will depend on detailed arrangements with the competition organisers and the financial demands of those activities, i.e. on securing the funding thereof.