

Complete system of municipal waste management

The text is based on the chapter Complete system of municipal waste management published in yearbook Prague Environment 2005.

System of the municipal waste collection in the City of Prague

In 1996 the Assembly of the City of Prague approved the Project of Waste Management (Decision of the City Council No. 47 of 16 January 1996). The project has been implemented since 1998. It is the entire City covering complete system of sorting of municipal waste. The waste sorted fall into the following categories:

- paper and cardboard;
- mixed glass;
- mixed plastics;
- mixed bulky waste;
- mixed waste;
- hazardous waste;
- ferrous and non-ferrous metals, demolition waste, electrotechnical waste, waste from care for greenery, wood waste, tyres.

For the Project implementation the City of Prague concluded appropriate contracts. The basic agreement on the provision of municipal waste management is the Contract with the joint stock company of Pražské služby (the system operator). This company provides for the implementation of the whole City collection of mixed waste, sorted waste (paper, glass, plastics), and mixed bulky waste through its subcontractors (Ipodec – čisté město, a. s., Komwag, podnik čistoty a údržby města, a. s. and AVE CZ odpadové hospodářství, s.r.o.). The collecting companies are assigned to the collection service in pre-determined parts of the City (see the figure below).

Fig. The organisation for the collecting of mixed and sorted waste, 2008

Source: OOP MHMP

Fig. The Prague's collecting yards, stationary collecting points of hazardous waste and facilities for waste treatment, processing, reuse and disposal, 10/2006

Source: OOP MHMP

Fig. Amount of municipal waste in 1998–2004

Source: OOP MHMP

Tab. Municipal waste management in 1998–2005

| Year | Municipal waste [kt] | Disposal [kt] | Reuse [kt] | | | |
|-------------|----------------------|---------------|----------------|-------|------|-----|
| Landfilling | Total | Energy use | Material reuse | | | |
| sorted* | Iron from cinder | | | | | |
| 1998 | 231,6 | 94,5 | 138,0 | 129,1 | 8,0 | 2,0 |
| 1999 | 240,9 | 31,3 | 209,6 | 193,6 | 16,0 | 3,1 |
| 2000 | 251,1 | 59,2 | 191,9 | 166,9 | 25,0 | 2,9 |
| 2001 | 257,2 | 31,9 | 225,3 | 196,3 | 29,0 | 2,9 |
| 2002** | 281,8 | 42,5 | 239,3 | 202,0 | 37,3 | 3,3 |
| 2003 | 292,9 | 43,4 | 249,5 | 205,4 | 44,1 | 3,6 |
| 2004 | 305,0 | 42,4 | 262,6 | 208,1 | 54,5 | 2,8 |

| Year | Municipal waste [kt] | Disposal [kt] | Reuse [kt] | | | |
|------|----------------------|---------------|------------|-------|------|-----|
| 2005 | 319,1 | 54,0 | 265,1 | 201,2 | 63,9 | 3,4 |

* including hazardous waste.

** The amount of flood-induced waste is not included.

Source: OOP MHMP

■ [Statistics on the municipal waste sorting in Prague, 1998-2005](#)

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Mixed municipal waste and mixed bulky municipal waste

Mixed waste

Provision for the collecting container large enough for mixed municipal waste is the duty of the landlord (pursuant to Section 6 a) of the Ordinance of the City of Prague No. 24/2001 Code). The total number of collecting containers at respective premises is approx. 108 000 pieces. The mixed waste collected is mostly turned into the Incineration Plant Malešice for energy generation. The rest is disposed at the mixed waste landfill of the company of .A.S.A., s. r. o. in Prague 8 - áblice.

Mixed waste is the only component of municipal waste in Prague, which collection and removal is not fully reimbursed by the City of Prague. A portion of costs (88 % in 2004) is directly born from the waste fee. The development in waste fee is summarised in Table B4.6.

Tab. The development in the fee for municipal waste

| Type of reimbursement | Ratepayer | Payer | Reimbursement collector | Number of payers |
|---|-------------------------------------|---|---|------------------|
| 1. 1. 1998–29. 2. 2000 Contractual price (established depending on the number, volume, and frequency of emptying of collecting containers). Landlord/administrator of the apartment house recalculated and distributed the amount among respective users. | Physical entity using the apartment | Landlord/ administrator of the apartment house | Pražské služby, a. s. (on the basis of an agreement with the City) | 85 000 |

| Type of reimbursement | Ratepayer | Payer | Reimbursement collector | Number of payers |
|---|-------------------------------------|---|---|------------------|
| 1. 3. 2000–31. 12. 2001 Fee for waste (established depending on the number, volume, and frequency of emptying of collecting containers). Landlord/administrator of the apartment house recalculated and distributed the amount among respective users. | Physical entity using the apartment | Landlord/ administrator of the apartment house | Prague City Hall – Dept. of the City Infrastructure | 85 000 |
| Physical entity having permanent residence there | | Prague City Hall – Dept. of the City Infrastructure | 1 200 000 | |
| Since 1. 1. 2003 Fee for municipal waste (established depending on the number, volume, and frequency of emptying of collecting containers). Landlord/administrator of the apartment house has recalculated and distributed the amount among respective users. | Physical entity using the apartment | Landlord/ administrator of the apartment house | Prague City Hall – Dept. of Taxes, Fees and Prices | 85 000 |

Source: OIM MHMP

Mixed bulky waste

In 2004 the Prague City Hall reimbursed the installation of approximately 8,800 large-capacity containers (VOK) with minimum volume 9 m³, i.e. 1 VOK per 130 inhabitants on average. The VOKs are allocated to the City Districts depending on their respective population and every City District has annually at least 24 VOKs at its disposal, that means on average 1 VOK emptying per fortnight, to prevent uncontrolled dumpsite formation. The City Districts decide themselves locations and dates of VOKs' placement. Some City Districts place further VOKs at their expense and decision. The mixed bulky waste is disposed at the mixed waste landfill of the company of .A.S.A., s. r. o. in Prague 8 - áblice.

Sorted collection of waste (paper, glass, and plastics)

The sorted waste collection on the territory of Prague is provided or by means of the kerbside collecting system. There are approximately 3,000 collecting points equipped with colour distinguished containers 1,100 to 3,200 litres in volume for glass, paper, and plastics.

Paper

The collected paper is gathered at after-sorting line in the premises of Pražské služby, a. s. in Prague 9. There admixed materials and impurities (approx. 9 %) are sorted out and the rest is sorted into cardboard, journals and magazines, and mixed paper. Finally, the paper is pressed into packets and by means of purchasers (as companies, for instance, Leo Czech, s. r. o., Euro Waste, a. s., Emba, s. r. o., Remat, s. r. o., Wit a Melosh) is, on the basis of contractual relations,

handed over to domestic and foreign paper mills for its further use.

Plastics

Plastics are aftersorted at the lines of the company of Sledge, s. r. o., Tuklaty near Prague and the company of Reviplast, Prague 5. The mixed plastics are, after admixed materials and impurities (approx. 10–15 %) are further fine sorted to respective commodities (for example, PET, polyethylene, polypropylene, polystyrene, etc.). The sorted and tradable material is subsequently pressed into packets or shredded. Then the raw material is purchased, for instance, by companies as follows: Jami, s. r. o., Holding, a. s., Sita Ecotech, s. r. o., .A.S.A., s. r. o., BAU Jirušky, Transform STOD, JTC Mnichovice, ICRO Tachov. The residual fraction, which cannot be treated by other method, serves for the production of so-called alternative fuel (the companies of Regios, a. s., and SITA Bohemia, a. s., for example).

Glass

Glass is collected the way so as it is not compacted and crushed in the course of its loading and transport which would make the subsequent aftersorting hard. Glass is sold to the company of AMT, s. r. o, Píbram, which provides for the removal of impurities and admixed materials (approx. 8 %), and then for aftersorting of glass and its handing over to Czech glass works for the processing (Vetropack Moravia Glass, a. s. Kyjov, Avirunion, a. s. Dubí).

Fig. The amount of sorted waste in 1998–2004

Source: OIM MHMP

Hazardous waste

In 2004 the complete system of the hazardous waste collection for Prague was provided by the company of IMP – servis, s. r. o. on the basis of an agreement. The collection and disposal of hazardous waste has been arranged at several levels as follows:

- mobile collection (250 routes with 8 stops for collecting points each in 2004);
- stationary collection (21 stationary collecting points of hazardous waste in 2004);
- refrigerating equipment collection (15 stationary collecting points of hazardous waste in 2004);
- additional collection of drugs, medicines, and mercury-filled thermometers (approx. 250 pharmacies in 2004);
- additional collection of discharged batteries (approx. 450 points at elementary, secondary, and higher professional schools, facilities of vocational training, Local Authorities of City Districts, and the Prague City Hall).

Tab. The hazardous waste amount collected in 1998–2004

| | Hazardous waste amount in tonnes | | | | | | |
|---|----------------------------------|------|------|------|------|------|-----|
| 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
| Mobile collection | 91 | 112 | 93 | 83 | 172 | 92 | 82 |
| out of that the collection of refrigerators | | – | – | – | 65 | – | – |
| Stationary collection | | 88 | 142 | 204 | 414 | 663 | 727 |

| | Hazardous waste amount in tonnes | | | | | | |
|---|----------------------------------|-----|-----|-----|-----|-----|-----|
| out of that the collection of refrigerators | | 25 | 57 | 123 | 283 | 447 | 491 |
| Collection of batteries and accumulators | | – | – | 1 | 7 | 8 | 8 |
| Collection of drugs, medicines, and mercury-filled thermometers | | 22 | 32 | 31 | 34 | 36 | 33 |
| Total | 91 | 222 | 267 | 319 | 627 | 799 | 850 |

Source: OIM MHMP

Collecting yards

One of the outcomes of the Project of Waste Management in the City of Prague was the “Sorted Collection of Waste by Means of Collecting Yards”. The Project established that about 20 collecting yards shall be established and operated on the City territory. In the collecting yards the citizens could turn, under the supervision of the operators, selected sorts of waste (bulky waste, waste from greenery, wood, demolition waste, metals, electrotechnical scrap, paper, glass, plastics, and hazardous waste) in respective large-capacity containers.

In 2004 there were seven stationary collecting yards of the City of Prague operated on the City territory (in the first half of 2005 two more stationary yards were put under operation) and one mobile collecting yard of the City of Prague was under pilot operation. Their operations are provided directly by a contracted company or by a City District, to which the Prague City Hall allocates and grants one-time annual non-investment subsidy for the collecting yard operation (CD Prague 12 and CD Prague 20).

The mobile collecting yard has been provided by the company of Remondis, s. r. o. on the basis of an agreement and has been serving areas where a stationary collecting yard cannot be built (historical structures, limited space option) the way that several large-capacity containers, with provided sorting of waste under professional supervision, are placed in locations for the period of one day while these days are repeated at regular intervals.

Authorities of some City Districts (CD Prague 4, CD Prague 6, and CD Prague 15) also operate their own collecting yards for the needs of permanent residents of their territories. In 2004 there were eight such collecting yards under operation.

Fig. The amount of waste returned and frequency of visits to the Prague’s collecting yards in 2000–2004

Source: OIM MHMP

Fig. Weight percentage of respective types of waste at the Prague's collecting yards in 2004

Source: OIM MHMP

Pilot projects launched in 2004

Pilot project for sorted collection of biological waste

In September 2004 the first Pilot Project of Sorted Collection of Biological Waste was launched, on the territory of the City District Prague - Dolní Chabry. The biological waste collection is carried out by means of special plastic made containers in brown colour, so-called compostainers. In total 800 pieces of containers, 120 or 240 litres in volume, were given to inhabitants. Each household also received a schedule of collecting trips. The biological waste collection is, first of all, aimed at waste from gardens and gardening. The collection is performed once in fortnight by the collecting vehicle, Mercedes brand, equipped with a special catching pan under the vehicle loading area. The collection is provided by the joint stock company of Pražské služby, which delivers the waste to further processing (composting) to the composting facility JENA in Úholiky near Velké Pilepy. In 2004 6.87 tonnes of biological waste were sorted and processed.

Pilot operation of the Composting Facility Malešice

In October 2004 the Composting Facility Malešice was built for preferential processing of biological waste by the City at Devická Street, Prague 10. The company of JENA – firma služeb became the composting facility operator on the basis of a tender. This City composting facility premises has area of approx. 7,083 m². The composting facility premises comprises of: operating room for the operators, roofed garages, warehouse, and surface water collecting sump. The operator built further temporary structures: bridge weight with the weight operator cabin and stands for material. The biological waste shall be processed by means of anaerobic composting technology. The facility is assumed to receive approx. 5,800 tonnes of biological waste per year, expected production of the processed biological waste by composting is approx. 4,600 tonnes per year. In 2004 the composting facility received 268.5 tonnes of biological waste.

Pilot project of sorted beverage cardbox collection

In November 2004 the City, in cooperation with the authorised company of EKO-KOM, a. s., started the pilot project of beverage cardbox collection. One third of sorted waste collecting points (paper, glass, plastics) in majority of City Districts out of the total number of approx. 3,000 points, were equipped with a collecting container 240 litres in volume marked with orange sticker saying "Beverage Cardboxes". The beverage cardboxes collection is organised by the same vehicles as the collection of paper, plastics, and mixed waste, while the vehicles are always labelled with the type of waste which is currently collected. On the collecting day the beverage cardboxes are aftersorted and pressed into packs in the company of Papkov, spol. s r. o. Then they are moved for further processing to the company of Papírny Blá, a. s. in Blá pod Bezdzem. In 2004 the amount of beverage cardboxes sorted out this way accounted for 9.1 tonnes.

Pilot project of the separated collection of clear glass

In December 2004 the City began the separated collection of clear glass due to the request of glass makers and also for the sake to acquire motivation bonus from the authorised package producing company EKO-KOM, a. s. the collection has been so far carried out at the collecting yards of the City of Prague. In 2005 the pilot project was expanded into several City Districts to stationary sorted waste collecting points in the streets. In 2004 1.84 tonnes of clear glass were sorted out.

Cleaning up of illegal dumpsites

In 2004 the City cleaned up approximately 7,500 tonnes of waste from illegal dumpsites. The waste composition is demonstrated in Figure. In total there were 44 orders implemented an overall costs accounted for approx. CZK 9.2 million (VAT excluded). The City Districts and non-profit organisations arranging for volunteer actions cleaned up non-negligible amount of illegal dumpsites as well.

Fig. Composition of waste from illegal dumpsites in 2004 [t]

Source: OIM MHMP

Information campaigns and environmental education implemented in 2004

Information materials for the Prague's inhabitants

In February 2004 every Prague's household received the brochure called "Sorted collection of paper, glass, and plastics and the hazardous waste collection on the territory of the City of Prague in 2004". The brochure contained the basic information on waste sorting (how properly sort out waste, how waste is further processed, statistics on sorting of waste in Prague), the list of collecting yards of the city of Prague (locations, connections, types of waste collected), the list of stationary collecting points for hazardous waste (locations, connections), schedule of the mobile collection of hazardous waste, and a competition for prizes.

In November 2004 a leaflet on the pilot project for the beverage cardboxes collection (how the project is organised, what shall be turned into containers, how the waste is processed, list of collecting yards, references to information sources) was distributed to every Prague's household.

Environmental education event for first graders of the Prague's elementary schools

In the course of January and February 2004 all first graders of the Prague's elementary schools received paper bags containing materials on issues of waste management and the city cleanliness (games, puzzles, colouring books, etc.). These materials were developed in cooperation with the joint stock company of Pražské služby, the company of IMP – Servis, s. r. o., and the authorized packaging company of EKO-KOM, a. s.

Environmental competitions in waste collecting at the Prague's elementary schools

In the school year 2004/2005 the competition in collecting of recycled paper was declared again (for the eleventh time) at Prague's elementary schools, this time under the name of "Grand Prize of Nestlé and Stedoeské sbrné suroviny". The competition is organised in cooperation and under the umbrella of the Prague City Hall by the company of Stedoeské sbrné suroviny. In that school year 104 elementary schools participated in (i.e. 48 % of all Prague's elementary schools). In total 35,108 pupils participated, which managed to collect so far the record breaking amount of paper in the competition history – 1,315,950 kg (38 kg per a pupil). The collected amount of paper at schools represents 9 % of the total amount of sorted recycled paper in Prague for the given period, entirely without any finances spent from the City budget.

In accompanying environmental competitions 34,417 plastic caps, 506 kg aluminium packages, and 116 kg of beverage cardboxes were collected as well.

The competition "Waste is Raw Material" for the Prague's elementary and secondary schools

In December 2004 the civil association of Arnika, with financial contribution from the Prague City Hall and in cooperation with OIM MHMP, MŽP, and CENIA, launched the first round of the competition for the Prague's secondary and elementary schools concentrated on issues of waste. This six-month-long project included knowledge contests, tours around facilities for sorting, recycling, reuse, and disposal of waste, expert lectures and various tasks (for example, pools and surveys, making of a press release, calculating of environmental trace of their schools and theirs, creating of Internet pages, making of a film, creating of fine art pieces and clothing models made of recycled materials, etc.). Over 380 students and teachers from 26 Prague's elementary and secondary schools took part in the competition.

Development in costs for the complete municipal waste management system in Prague

Table gives total costs for respective parts of the complete system of municipal waste management. The costs are given as with subtracted potential revenues from sales of sorted raw materials.

Tab. Total costs of the complete municipal waste management system in Prague in 1998–2004 [CZK]

| Total costs, including VAT [CZK] | | | | | | |
|----------------------------------|------------------------------|-------------|-------------|-----------------|------------------|-------------|
| Year | Paper, glass, plastics total | Bulky waste | Mixed waste | Hazardous waste | Collecting yards | Total |
| 1998 | 18 772 389 | 22 115 309 | 396 693 682 | 4 431 515 | 1 549 425 | 443 562 320 |
| 1999 | 63 717 283 | 26 744 089 | 501 553 173 | 11 756 082 | 2 946 885 | 606 717 512 |
| 2000 | 82 906 305 | 30 238 574 | 505 017 588 | 10 476 350 | 5 222 340 | 633 861 157 |
| 2001 | 88 822 998 | 32 674 169 | 532 408 853 | 15 913 397 | 5 579 983 | 675 399 400 |
| 2002 | 109 660 590 | 32 879 042 | 563 646 884 | 19 565 612 | 6 276 764 | 732 028 892 |
| 2003 | 140 833 027 | 33 835 283 | 583 760 192 | 23 623 678 | 11 390 683 | 793 442 863 |
| 2004 | 177 298 300 | 35 117 251 | 644 684 599 | 25 341 412 | 18 688 555 | 901 130 117 |

Source: OIM MHMP

Contribution from the company of EKO-KOM, a. s.

On the basis of agreement with the Prague City Hall with the authorised packaging company of EKO-KOM, a. s. the City shall receive every year "reward" for the registered sorted packages. The reward amount shall be proportional to effectiveness of the municipal waste sorting, that means on the amount of commodity sorted out and the number of the

Prague inhabitants. The City received “rewards” at the amount of CZK 22,899 thousand for 2001, CZK 39,531 thousand for 2002, CZK 69,166 thousand for 2003, and CZK 71,092 thousand for 2004. The finances are returned back into the system and are used for the reimbursement of costs for the collection and disposal of sorted waste.

Subsidies from the State Environmental Fund of the Czech Republic

On the basis of a decision of the Minister of the Environment of the Czech Republic the Prague City Hall and the State Environmental Fund of the Czech Republic concluded in 2001 an agreement. According to the agreement the City should receive the subsidy at the amount of CZK 31,710 thousand for the collection and disposal of 50,000 pieces of refrigerating equipment in 2001 through 2005. The subsidy was provided within the framework of the Ministry of the Environment of the Czech Republic “programme 2.6 – protection of the Earth ozone layer”.

Fig. Development in costs for municipal mixed waste

Source: OIM MHMP