The Waste Treatment Plant

DIE 48ER

DEIN WIEN

CITY OF VIENNA

Vienna is special.

The Waste Treatment Plant

Sorting plant for plastic bottles

After 25 years of legal and technological changes and innovations, the waste separation plant called "Tent 48" because of its distinctive shape has become the heart of Vienna's successful waste management system (and the biggest facility of its kind in Austria), despite the scandals involving the former private owner Rinter AG. Not being right at the centre of public interest, however, the myriad activities behind the façades of this facility with an average of up to 250,000 tonnes of treated waste per year are almost unknown among Vienna's citizens.

Development of the waste treatment plant

In 1985 and 1986, a pre-sorting plant for commercial, industrial and bulky waste was built on behalf of the City of Vienna in the western half of the tent. This installation has been handling the separation of plastic and cardboard packaging material ever since the coming into force of the 1994 Packaging Ordinance.

From 1989 on, buildings and facilities were added to the waste treatment plant on an ongoing basis. As a result, the waste treatment plant of the City of Vienna (German acronym "ABA") currently disposes of the following treatment units:

- Sorting plant for plastic packaging materials
- Treatment plant for residues from waste incineration plants
- Station for the removal of potentially hazardous substances from waste electrical and electronic equipment
- Central collection site for hazardous waste

- Logistics centre for separately collected recyclables with hook-up to railway network

Today, the waste treatment plant of the City of Vienna with its annual throughput of 250,000 tonnes is the hub of Vienna's waste management system and Austria's biggest treatment plant for the processing, sorting, sealing and packaging of waste of practically all types and categories. Moreover, the following external units are part of the plant's logistics and organisational system:

- Lobau composting plant
- Simmering biogas plant
- Simmering waste logistics centre

Waste and its treatment

Every year, approx. 250,000 tonnes of waste are treated or put on interim storage here; of this total, around 200,000 tonnes are residues from incineration; 40,000 tonnes concern recyclables, and 4,000 tonnes are composed of problematic and hazardous waste.

Some recyclables have to be compacted into bales for storage and transport. Baling presses inside the tent compact cardboard, plastic fractions of varietal purity and mixed plastic fractions from plastic sorting. The compacted bales are then transported to the respective processing facilities by railway or lorry.

The plant offers various possibilities for the interim storage of recyclable and waste materials before they are taken away for treatment or disposal: big boxes for metals and glass are situated along the plant's railway track; another storage area is available for boxes for waste wood, bulky waste, building and construction waste, Styrofoam and finished compost; skips serve for residues transported in compacted form or loosely in containers; other storage zones hold bales; and a central collection point takes care of problematic or hazardous waste.

Treatment plant for incineration residues

The thermal treatment of residual and bulky waste, sewage sludge and hazardous waste in the respective waste incineration plants unfortunately leaves a certain quantity of residues. About one third of the input volume remains as various incineration residues at the Spittelau, Flötzersteig and Pfaffenau plants and in the Simmering ovens – e.g. as slag, bottom ash, filter ash as well as flue dust and filter cakes from flue gas purification. In figures, this corresponds to 151,000 tonnes of incineration residues and bed ash, approx. 34,000 tonnes of flue ash and about 2,400 tonnes of filter cakes from thermal waste treatment plants per year.

All these residues with the exception of filter cakes and ash from incineration plants for hazardous waste are taken to the "48 Tent" for further processing at the treatment unit for incineration residues.

Storage boxes for recyclables

Treatment plant for incineration residues

Central collection site for problematic and hazardous waste

During mechanical treatment comprised of several processing steps – sifting, crushing, demetallising –, iron components and non-ferrous metals (e.g. aluminium, copper, brass, etc.) are removed from the slag. Moreover, the slag is reduced to a particle size that ensures optimum mixing with filter ashes, cement and water to produce ash-slag concrete. This is necessary to comply with the strict legal requirements of the Landfill Ordinance for the permanent disposal of this concrete in the form of steep earth walls at the Rautenweg landfill.

Central collection site for hazardous waste from households and commerce

The problematic and hazardous domestic waste collected at dedicated sites spread all over Vienna is either immediately incinerated or taken to the central collection site for problematic and hazardous waste for separation, sorting and interim storage.

This is a storage and transhipment centre both for the recyclable portion of the waste thus collected and for waste from commercial and private shipments defined as clearly hazardous, which must be subjected to special treatment.

Recyclables include e.g. cooking oil, lead accumulators and toner cartridges. Fluorescent lamps, waste containing mercury, commercial batteries, acids, lyes and other chemicals are destined for further special treatment. To prevent harmful

substances from leaking into the groundwater in case of an accident, the storage building was equipped with a multibarrier system that extends down to the basement level.

Sorting plant for plastic bottles

The collection and related recycling of plastic materials may look back on a long tradition in Vienna. Thus the collection of light packaging was introduced in 1989 following successful pilot-scale tests: collection started with plastic foils and yogurt cups.

In 1993, the collection of hollow plastic items (e.g. plastic bottles) was initiated. The coming into force of the Packaging Ordinance on 1 October 1993 led to the collection of all types of plastic packaging covered by the ordinance (foils, hollow items, etc.) in one mixed system. Since that day, the system for the collection, treatment and recycling of plastics has been undergoing a process of constant change and optimisation. Until 2005, approx. 8,000 tonnes of mixed plastics were collected annually in the context of plastic bottle collection; unfortunately, this volume also included approx. 3,000 tonnes of non-recyclable materials incorrectly disposed of (mainly residual waste). To improve the quality of the material collected, plastic collection for households was switched to the exclusive collection of plastic bottles from September 2004 to May 2005. For this purpose, visually striking containers with very conspicuous openings for introducing waste (called "Kermit containers") were developed and installed. The collection of plastics originating in commercial enterprises continues without exception for all light packaging (mainly foils of large dimensions). This set-up allows for efficient, ecologically and economically viable collection and moreover enables the recycling of a very high share of recyclable plastics. The targeted collection and processing of plastic bottles thus creates the preconditions for reprocessing beverage bottles (bottle-to-bottle recycling).

Separation at the plastic sorting plant

Despite the collection of plastic fractions of the highest possible varietal purity (PET bottles from households and foils of commercial and industrial origin), meticulous sorting of the material collected is a basic prerequisite for all successful recycling measures. During the sorting phase, the plastic bottles are first separated from the other materials collected in the same batch to re-sort them subsequently for colour and material in an automated sorting station. The high quality standard required is safeguarded by a final visual inspection.

To be able to sort material delivered in bags, these must be opened and emptied. This is done by the "bag opener", which also ensures even material distribution across the plant. Several sequential sorting steps then ensure the removal of all other attached substances from the plastic bottles. A two-tier, ten-metre sieve first discards non-recyclable small parts (less than 40 mm) as well as bigger items (foils, cans, buckets in excess of 300 mm).

PET bottles clear, blue, green

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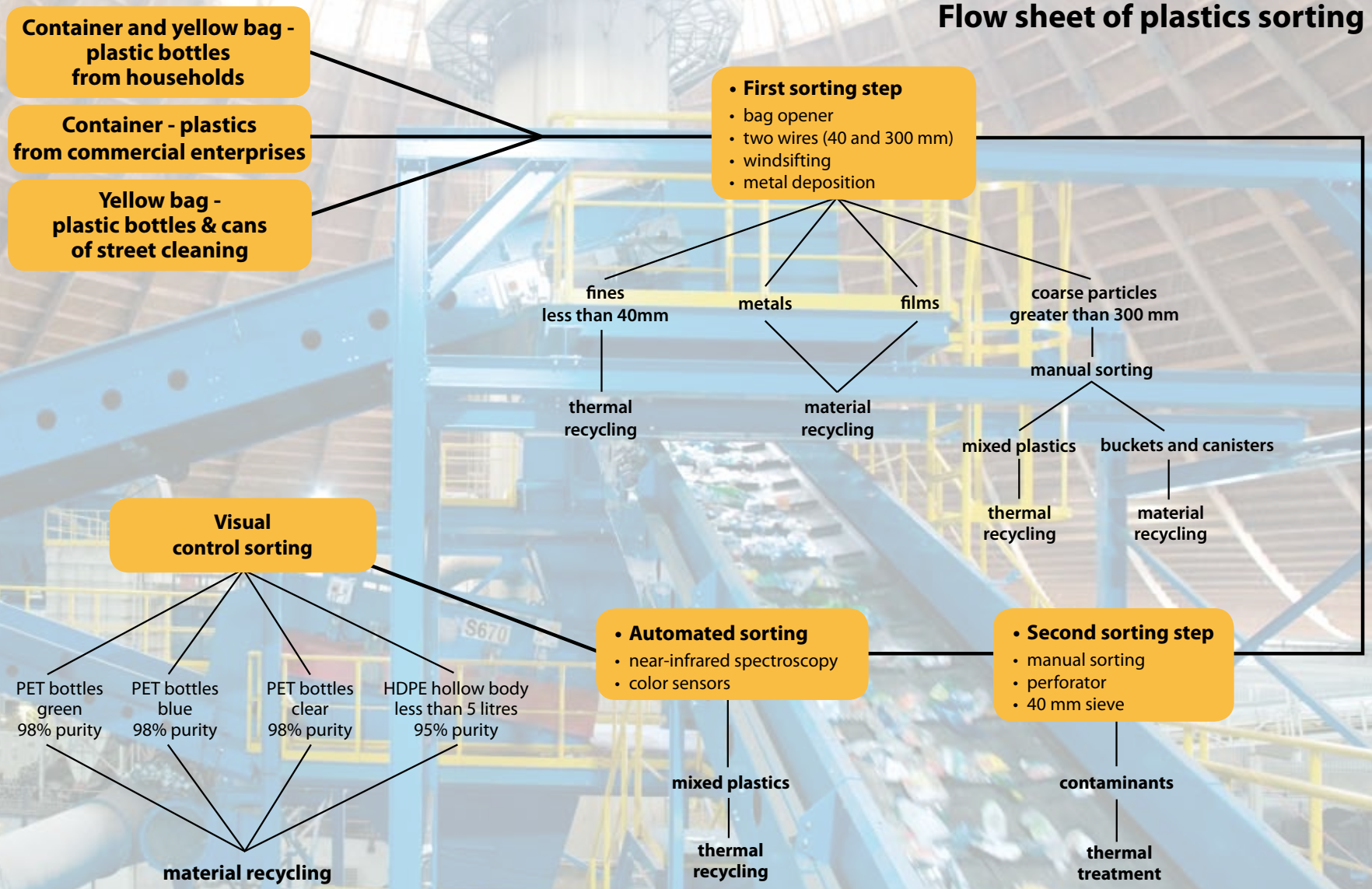
Flow sheet of plastics sorting



Subsequently, the remaining foils are winnowed out with a wind sifter (rather like a huge vacuum cleaner); then all metals are removed. Magnetic metals are eliminated by means of an over-band magnet, while non-magnetic non-ferrous metals with good electrical conductivity (aluminium cans, copper wire) are ejected by the non-ferrous metal separator. The PE (polyethylene) foils, cans and buckets thus obtained are manually re-sorted and then recycled in other units. Obviously, this also applies for the separated metals.

The remaining bottles are manually cleared of all contaminants and incorrectly disposed items (household waste) and then relayed via a perforator and another sieve to the automated station. It is the task of the perforator to prick and flatten the bottles so that they will not fall off the fast-moving conveyor belt. Any residual liquid in the bottles runs off through the sieve and hence does not reach the automated station.

At the automated sorting station, the bottles are subjected to irradiation. Near-infrared sensors analyse the spectrum of light reflected by the bottles and thus identify the material on the conveyor belt. At the same time, colour sensors recognise the colour of the bottles. Computer-controlled compressed air jets then blow out the duly identified bottles in less than a second. This results in PET (polyethylene terephthalate) fractions in three colours (blue, green and clear) as well as in HDPE (high-density polyethylene) in various colours. These recyclables are collected in four big containers and compacted into bales. The bales are then relayed to recycling companies for secondary raw material production. What is left in the sorting station – called "mixed plastic fraction" – is likewise compacted into bales and incinerated, which helps to cut down on primary fossil fuel consumption.

Life cycle of plastics

After sorting, bottles are delivered to various recycling facilities for material recovery. They are shredded and small parts (caps, labels) not needed for recycling are removed. The recovered PET is then recycled in a multistep process. PET can only be reused for producing new bottles if sorting purity is high and non-beverage packaging is removed.

The closed PET cycle allows for the reprocessing of empty PET beverage bottles (bottle-to-bottle recycling). Moreover, fibres for sportswear and casual clothing, garment linings and household textiles, but also packaging such as yogurt cups, margarine tubs and packaging straps are made from recycled PET as well.

What is PET?

PET (polyethylene terephthalate) from the polyester family is a plastic that can be used for a multitude of products but is mainly employed for packaging purposes; it also lends itself very well to recycling after use.

PET is entirely made of petroleum and natural gas. Approx. 1.9 kilograms of crude oil are needed to produce 1 kilogram of PET, requiring an energy input of roughly 84 megajoules (23 kilowatt-hours). PET presents almost the same characteristics as a secondary raw material if compared to its properties as a primary one. The recycling of used PET items allows for an energy input reduction of 60% vis-à-vis primary production.

Storage box for stained glass

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