



## FUTURE TRENDS OF WASTE MANAGEMENT STRATEGIES IN HELSINKI METROPOLITAN AREA

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### Wastes in Finland

Approximately 127 million tonnes of waste and comparable by-products were generated in Finland in 2000. Of this total amount, the largest quantities are surplus soil from construction (34 million tonnes), wall rock, ore dressing sand and other soil material from mining and quarrying (26 million tonnes in all), straw and manure from agriculture (25 million tonnes) and wood felling waste from forestry (20 million tonnes). Altogether nearly 17 million tonnes of waste were generated in manufacturing in 2000, of which the largest quantities were waste wood and bark, slag from the basic metal industry, especially gypsum, and liquid wastes from the food industry. The annual volume of solid municipal waste amounted to 2.6 million tonnes. Smaller amounts than those listed above were generated as ash and slag from energy production, construction materials from new building and demolition and as sludge from waste water treatment.

On average, 40 per cent of all the generated waste are recovered by the national economy as a whole. In terms of volume this represents approximately 50 million tonnes. Wastes like surplus soils from construction, as well as manure and straw, were recovered in large volumes. Manufacturing recovered 67 per cent of its waste, either as energy or as raw material. Good waste and the construction and demolition waste generated were recovered in 2000.

Over one-half of industrial waste comes from the forest industry. In 2000, the pulp and paper industry generated 7 million tonnes and the manufacture of wood products 3 million tonnes of waste. The next largest generators of industrial waste, in order of generated amount, were the chemical industry, basic metal industry, manufacture of metal products, food industry and manufacture of non-metallic mineral products. Changes in the volumes of waste generated in different industries and in their relative shares were, in fact, surprisingly small in the past decade, and reflected cyclical or output volume variations rather than structural changes in waste generation or production. Especially calculated per capita, the Finnish volume of waste can be regarded as large by European comparison.

Wastes can be classified into three categories: non-hazardous, inert and hazardous. A vast majority of industrial wastes is non-hazardous, in other words not considered hazardous. Inert waste is in practice solid mineral waste, like stone, often deposited in the place of its origin. Calculated using the current definition of hazardous industrial waste, this waste category made up 6.5 per cent of the total volume of industrial waste. Application of the current definition

almost doubled the volume of hazardous industrial waste. The biggest generators of hazardous industrial waste are the basic metal industry, manufacture of metal products and the chemical industry. In 2000, the total generation of hazardous waste in industry was 1.1 million tonnes.

Since 1987 the recovery rate of industrial waste has been going up in Finland by more than one percentage point per year, on average – from 50 to 67 per cent. Especially well recovered waste types are wood and bark waste, scrap metal, waste generated in the manufacture of food products, packaging waste and sludge from waste water treatment. Roughly 30 per cent, or 4.9 million tonnes, of industrial waste is land filled. Over the past few years, the treatment of industrial waste has undergone a greater change than has its generation.

The main wastes from energy production are ashes from combustion and gypsum from desulphurization. Fly ash accounted for nearly 80 per cent of the ashes. In 2000, the total amount of ashes generated by all combustion plants was 1.2 million tonnes. The amount of fly ash from coal combustion decreased in the past decade, in particular, whereas that from peat combustion has almost doubled from 1992. More than one-half of ash is recovered. It is used in soil structures and as raw material for construction materials. It should be noted that the volume of waste from plants belonging to the energy production industry is smaller than the overall volume of waste generated in thermal processes.

Waste generation in house building totaled approximately 1.4 million tonnes in 2000. The amount includes wastes from new building construction, renovation and demolition, but excludes surplus soils from house building. The distribution of house building waste between new, renovation and demolition building, changed markedly in the past decade, so that the proportion of waste from renovation building increased by 20 percentage points while that from new building diminished correspondingly. In 2000, renovation building generated 800,000+ tonnes of waste. Both mineral waste and wood waste made up 36 per cent of the total waste generated in house building.

Approximately 10.5 million tonnes of surplus soils were generated by house building in 1999. Additionally, approximately 20 million tonnes of surplus soil masses were generated in civil engineering, such as road building and harbour dredging. The practice in classifying surplus soils from construction as waste varies by country.

The main municipal waste types are packaging waste, organic waste and waste paper. Nearly 500 kg of municipal waste per capita are generated in Finland every year and this equals the European average. Households generate annually just under 200 kg of waste per capita. Good one-third (39 %) of municipal waste is recovered, while the rest (1.6 million tonnes) is landfilled.

A total of 1.2 million tonnes of packaging was used in Finland in 2001. Considering that about two-thirds of all packaging is reused, the real annual total volume of packaging waste is approximately 460,000 tonnes. Over one-half of the packaging waste is paper or fibre, although their share of the packaging that is used is notably smaller than this. The rate of paper recovery for recycling is one of the highest in Europe in Finland, approximately 72 per cent in 2002.

Landfill sites are still important waste disposal and treatment places. However, decreasing their number and raising the level of waste treatment on them along with a strong reduction of the volume of landfilled organic waste are common European waste management targets. By the year 2002, the number of operating landfill sites had fallen to 243 in Finland, whereas ten years earlier they had numbered twice as many as this. Operating and closed landfill sites in Finland presently number almost 1,900. A total of approximately 8 million tonnes of different kinds of waste from production and consumption were landfilled in 2000. Approximately 4.9 million tonnes, or 60 per cent, of this total originated from industry.

Expressed in terms of dry matter, the sludge from municipal waste water treatment plants totaled 160,000 tonnes in 2000. The "real" volume, that is the wet weight, of the sludge was approximately 1.1-1.2 million tonnes. Sludge from waste water treatment plants is used for soil improvement in public green area building and agriculture. Under 10 per cent of the sludge was landfilled.

The total amount of hazardous waste generated in 2000 was 1.2 million tonnes. The largest groups of hazardous waste are wastes from the processes of metallurgy and inorganic chemistry, waste oils, solvents, and wastes from thermal processes. Some hazardous waste is treated and recycled by the producers themselves, while some is treated at the national hazardous waste disposal plant or at other hazardous waste treatment plants. A certain amount is also kept in long-term "storage". The amount of hazardous waste received at the national hazardous waste disposal plant exceeded 133,000 tonnes in 2003. Waste oil made up over one-half of this. The thousands of land areas where the soil is graded as "contaminated" are also classified as hazardous waste. However, they are not included in these hazardous waste statistics.

## **Waste Management Strategies in Helsinki Metropolitan Region**

### **Introduction**

Helsinki Metropolitan Area Council (in Finnish, Pääkaupunkiseudun yhteistyövaltuus-kunta, or YTV) is a statutory, co-operative organisation operating in the municipalities of Helsinki, Espoo, Vantaa and Kauniainen. YTV works on waste management, public transport and development planning, and in addition monitors the air quality in the metropolitan area.

The YTV Waste Management Department plans and develops waste management and coordinates waste transports; it handles waste and composts biowaste, collects in some extent reusable waste, and manages hazardous waste. YTV also gives advice on waste management in the metropolitan area.

The metropolitan area population is approximately 960 000 on an area of approximately 740 km<sup>2</sup>. The area is about 95% urban and is made up of 75% high rise apartment blocks. Approximately 450 000 households are covered. The average population density is 1 260 people per km<sup>2</sup>, though the density is much greater in the urban centre.

The metropolitan area produces about 1.1 million tons of waste every year. Over 500 000 tons of the total amount of waste is taken to the YTV waste-handling centre in Espoo. The only landfill site in the metropolitan area is also located at the same site and it receives about 300 000 tons of municipal waste. Some 55% of all the waste produced in the metropolitan area is recycled or reused.

The operational strategy of YTV Waste Management has been divided into three substrategies:

- The waste minimisation strategy, which aims at reducing the amount of waste generated and increasing recycling through source separation of waste
- The strategy for safe and customer-oriented waste management services and
- The strategy for treatment and final disposal of waste.

## **Principles of waste strategies**

### **Waste avoidance and reuse**

YTV has prepared the Helsinki area waste prevention strategy. According to the strategy and previous measures the main tools for waste prevention are information and training for various target groups, e.g. schools, institutions, companies.

### **Waste collection and transport**

YTV arranges waste (refuse and biowaste) transport for the households. Industrial and commercial property owners are responsible for collection and transport of their waste.

The "YTV areas" are divided into 60 sub areas. YTV prepares waste transport plans for each sub area and then the plans are sent out for bidding. Generally, waste is collected and transported by waste collection vehicles equipped with compaction machinery. Over 80% of household waste are collected in 600 – 660 litres waste bins.

Waste transport is based on competitive bidding among private companies. A winning company gets a fixed price contract for five years period. The system has cut the collection costs. Simultaneously the quality and environmental impacts of the waste transports has improved due to the challenging demands set forth in the contracts.

### **Collection and composting of biowaste**

Separate collection of biowaste, started year 1993 and is covering the whole area. The collection takes place weekly. All compostable food and garden wastes are collected.

### **Recyclables**

The Metropolitan area waste management regulations require separate collection of paper from premises comprising more than four dwellings and also of cardboard and 'office' paper from major producers. Premises subject to separate collection have paper and cardboard collection bins in their refuse areas.

**Hazardous waste**

YTV is responsible for the hazardous waste management of households in its operating area. Also most of small and medium sized enterprises use YTV's hazardous waste services. A major processor of hazardous waste in Finland is Ekokem Oy, which operates in Riihimäki.

**Landfilling of residual waste**

The Ämmässuo landfill is the largest in Finland. The total area is 150 hectares and the heaping area currently in use covers 50 hectares. In 2003, 315 000 tonnes of residual household waste were deposited in Ämmässuo landfill.

Waste deliveries to Ämmässuo are fully controlled. All waste loads are weighed and the amounts and type of materials are registered on computer. Waste tipping on the area is monitored by YTV's load inspectors, who check the grades of refuse coming into the landfill. After tipping, the waste is crushed and compressed with landfill compactors and covered daily with a layer of soil.

The landfill is built partly on solid rock and partly on 2 mm thick plastic membrane, which protects the groundwater. All leachate waters in the landfill area are channelled through drains to their own balancing basin, where they are pumped over 6 kilometres to Suomenoja sewage works in Espoo for treatment. The landfill is also equipped with landfill gas collection and recovery system.

**Future plans**

YTV has planned a waste treatment strategy, which consists of three stages: 1) Closing and covering the current landfill area, 2) Establishing the treatment facility for the mixed waste and 3) Construction of the final disposal area for the pre-treated waste.

The targets of the strategy arise from expected changes in waste legislation and from tendency towards to ecologically sound waste treatment. The strategy focuses on the residual waste and its not contradictory or replacing any existing source separation based recycling activities or waste prevention measures.

YTV plans in capital area to build an incinerator of a 250 000t capacity. In all Finland several incinerators in planning stage or permit process. For example, in Sweden there are about 30 incinerators. and 90 % of municipals waste is burnt and rest is landfilled.

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