

Urban waste management: Development in Helsinki 1945-1983

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Abstract

Viable waste management is crucial for the functioning of a city. Still, the urban history of waste management and its historical development in the capital of Finland has been researched only little. In post-war Helsinki the policy makers were struggling with the demands to improve the waste disposal methods towards more hygienic ones, the increased amount of waste to be handled, financial burden caused by waste disposal and with scarce land area for waste disposal purposes. Landfills, incinerating and composting were utilised as waste disposal technologies after 1945, of which both composting and incineration were abandoned at the latest by the early 1980s. In the choosing of waste disposal technologies different interest groups have presented controversial viewpoints and the contradicting opinions have led to heavy debates around the topic. The main reasons for the change in emphasis towards landfills were economical and environmental deficiencies in composting and incineration and the simultaneous improvement of landfilling methods. Air pollution has played a significant role in the debate about proper waste disposal technologies. A key aspect in the support for landfills has been its capability to adjust the technology to meet the demands arisen from the public concerning environmental quality and thus the wellbeing of citizens.

Introduction

Waste management is a part of the crucial infrastructures, which are essential for the functioning of a city as a dense concentration of human activity and for the wellbeing of the people living in the city. The development of municipal engineering has been indispensable for the flourishing of the modern city as the circulation of material inevitably needs also mechanisms for the disposal of material from the urban environment. Urban environmental problems related to the disposal of solid waste are anthropogenic in nature and the key problem of these human discharges are the ill effects of them. The negative impacts can be divided into those that are directly perceptible by the human beings and those that affect the quality of the urban environment and through environmental degradation also indirectly the wellbeing of citizens. Naturally also the indications of environmental problems are related to human perception and the harmfulness of some technologies is evaluated by the wellbeing of the humans. This approach to urban environmental history can be described as anthropogenic.

Environmental history research on Helsinki has in recent years increased (see e.g. Kruut 1998; Laakkonen 2001; Laakkonen et al. 2001; Laakkonen, Laurila & Rahikainen 1999) but the emphasis has been in the pre-war period and mainly on other topics than waste disposal. Historical approaches to the development

of municipal engineering and within it also waste management have been written (e.g. Turpeinen 1995), but the viewpoint of the environmental aspects of waste disposal has mainly been ignored. Environmental history as a subject of academic interest in Finland is relatively young and still evolving. Internationally the topic has been investigated more extensively and valuable work on urban waste management has been done by e.g. Melosi (2000; 1981) and Tarr (1996).

This paper examines the development of the implementation of different waste disposal technologies in post-war Helsinki, and with an argumentation analyses the motivations and arguments of the city authorities and interest groups are explicated. Attention is paid to the advantages and disadvantages of different technologies in the context of technological improvements and changing attitudes as time passes. Special focus is given to the weight of waste related environmental problems, especially air pollution. This paper covers the historical period from 1945 until the early 1980s.

Here “waste” is defined to be the material produced in the city that was treated as futile and which needed to be eliminated from the every-day system. The study is limited to solid urban waste and it concentrates on the different disposal technologies – collection and transportation are mentioned only when they are of relevance to the choice of the disposal method. The source material consists of mainly archive material of the city administrative organs and in addition to that newspaper material and journal articles have been used. First the general situation in Helsinki after the war is described followed by the presentation of the different disposal mechanisms used and the argumentation for the technologies is discussed. Consequently the environmental effects of the decisions are considered and conclusively some more general observations about the development of waste disposal technologies are presented.

Helsinki and its waste problem after 1945

The imprints of the Second World War were largely visible in Helsinki in the latter half of the 1940s. At the same time with severe shortages of nearly all goods the city grew to a metropolis within a very short time. In 1946 large independent communities around the city were joined to Helsinki, and its area grew roughly fivefold, from ca. 30 to 163 km² and more than 50 000 inhabitants. At the same time tens of thousands of refugees from Carelia settled in the city. Migration from the countryside reached proportions not experienced before. Also birth rates grew rapidly and altogether during the 1950s the population of the city grew altogether by nearly 23 %. (Turpeinen 1997, 13-19) The city was not able to build the urban infrastructure fast enough and to respond to the demands of urban living standards. Insufficient sewerage and improper housing conditions were regular reasons for public debate and hygienic problems were considered as crucial defects in Helsinki (Herranen 1997, 150-151). The management of solid urban waste made no exception. The comprehensive process of first reconstruction and then modernisation, which started in Finland after WWII and culminated during the 1960s with the turn to a modern consumer society, meant increased consumption of goods (Jokinen & Saaristo 2002, 88-91), and as an obverse-increased amounts of solid waste. Figure 1 shows the increase of population and the increase of waste produced in the city. At the same time the composition of the waste changed. In the earlier times waste was mainly organic and homogeneous material. With the introduction of new materials, increased import of goods and diversification of consumption the consistence of waste altered and new problems arose as old methods for waste disposal were not anymore suitable. (Turpeinen 1995, 268)

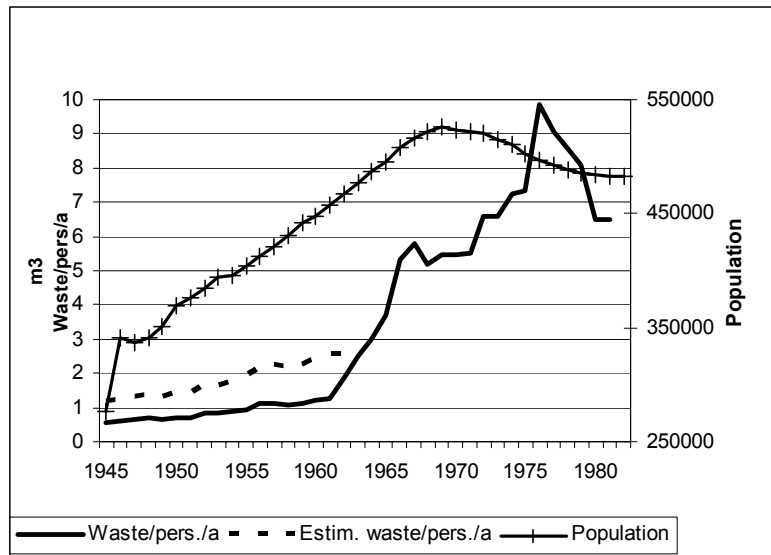


Figure 1: Population and waste produced annually per person in Helsinki during 1945-1980. (The statistical yearbook...; BPS, Annual reports 1945-1980). The compilation of statistics about waste changed in 1963. Before that the number includes only the waste that was transported by the city, so the real amount of waste is higher. The dash line shows an estimation of the total amount of waste produced per person. For the period before 1963 it is important to take note of the increasing trend.

The regulations over waste management were written into the Health Care Law of 1927 until it was replaced in 1967 by a reform of the law. Additionally some regulations were written also into the construction and water legislation. According to the health care law the community was obliged to provide a place for waste to be stored or in some other way to organize facilities for the disposal of solid waste. (Väestökeskuksen..1969, 13) In the administration waste management was primarily seen as a hygienic question where the total costs of the system were of great importance. (Starck 1958, 195)

Technologies of solid waste disposal in Helsinki

In densely populated areas in Helsinki waste was typically collected in the inner courts of the quarters. A container, usually cast of cement and covered with a steel plate, was placed at the last corner of the area and people carried their waste in baskets and threw it in. They were virtually never properly cleaned or washed and they gathered rats and often stank terribly, especially in the summer during hot weather. (Lindfors 1970, 347) When the container was filled up, the garbage was shovelled by the driver into a collecting car and driven to a dump. In the following passages the different options for waste disposal are presented.



Figure: A waste container is emptied to a car in southern Helsinki (district Punavuori) in 1949 or 1950. Foto: Eino Heinonen, HCM.

Tipping

The city engineer described the use of refuse tips as “storage of waste in place where it causes fewer nuisances than in the yards” (Starck 1958, 196). Geographically the city of Helsinki provides a disadvantageous location for the disposal of waste on the ground. The city centre has been built on a peninsula and it grew northward. With the increase of settlement next to the centre, refuse tips had to be located further off and the distances increased quickly. (See Figure 2) In 1947 a special dump-committee was set up to investigate the waste storage situation of the city and especially of the new joint areas. The conclusion was that despite the relatively large land area of the city, finding sites for landfills was extremely difficult and would continue to be so in the future. On the one hand landfills could not be located close to residential areas, but on the other hand too high transportation costs because of long distances must be avoided. (Memoranda of CG, 12/1950)

The disposal of waste on wasteland meant open dumps. The dumps were partly not controlled in any way or the methods of treatment were underdeveloped. Refuse tips in the city area caused regularly nuisances to the neighbouring housing and complaints to the city council and the health board were common. The complaints concerned the stench rising from the fills, paper flying around and the occurrence of gulls, rats and flies in the surrounding area. The dumps also caught regularly fire and led to stinking smoke floating in the surroundings. (FD, Annual reports) Wherever a plan to establish a new landfill was published, the NIMBY-phenomenon was soon perceptible. Different residential associations and groupings organised themselves to oppose the plan. Regular newspaper articles about nuisances caused by present tipping sites must have added to the bad reputation of tipping sites. Next to the official landfills of the public sanitation department unofficial dumps occurred around the city. Especially remote, empty sites typically became slowly dumps with all the imaginative nuisances. Complaints from neighbouring residential areas were regular and also Council initiatives to abandon tipping completely were made. (CC, 30.8.1950, Agenda 14, N:o 82)

It was evident that in any case the city could not abandon tipping sites as a whole because at least the residues from incineration must be stored in the ground. Also the transport costs from the furthest corners of the city to plants of other disposal methods would be too high, which meant that a persistent motivation to improve the land fill methods existed. As a reaction to complaints the treatment of dumps was improved and e.g. compression of waste in landfills started in the 1950s at the one main refuse tip of the city and also guards were employed to keep the disposal of waste regulated. (Leminen, Arovaara & Forss 1993, 7) In small steps tipping methods were improved and the concept of the sanitary tipping was introduced following examples from abroad. The foundation of refuse tips to swampy lands still hindered the application of all known methods (e.g. the use of heavy vehicles), but controlled tipping, the Bradford-method, was becoming the objective of waste disposal based on tipping. It combined several advantages: the decrease of nuisances compared to the dumping system and the possibility to gain new land area for recreational purposes. The danger of ground water degradation was acknowledged but it was considered manageable with modern methods. (Väestökeskuksen ..1969, 99) The new main landfill in a western district (Iso-Huopalahti), which was founded in 1962, was the first completely controlled sanitary tip in the city. Waste was compressed and covered daily with soil and sown with grass. A waste management report from 1969 states that the sanitary landfill is the most economic way of disposal, which also meets the requirements of hygienic standards. (Väestökeskuksen... 1969, 98) Land area for landfilling was still a scarcity but there were signs of possible cooperation with the neighbouring communities in the future to solve the problem of suitable land area for a sanitary landfill. (First attempt with the community of Espoo in 1963 (LC, documents)).

In the early years the nuisances caused by tipping were considered unbearable and unacceptable. The need to improve the condition of tipping sites was unanimously recognised, but nuisances persisted and no quick change in tipping methods was achieved. This led to increasing support for other waste disposal technologies. The dumping of waste meant also that the value of the waste was lost for good. At least in theory the other methods utilised the waste in a rational way (soil enrichment or heat energy). The international development was followed carefully and it was pointed out that abroad the incineration of urban waste was the prevailing trend, which decreased the support of tipping and encouraged devotion to incineration. (BPS 13.2.1956, Agenda, N:o 5)

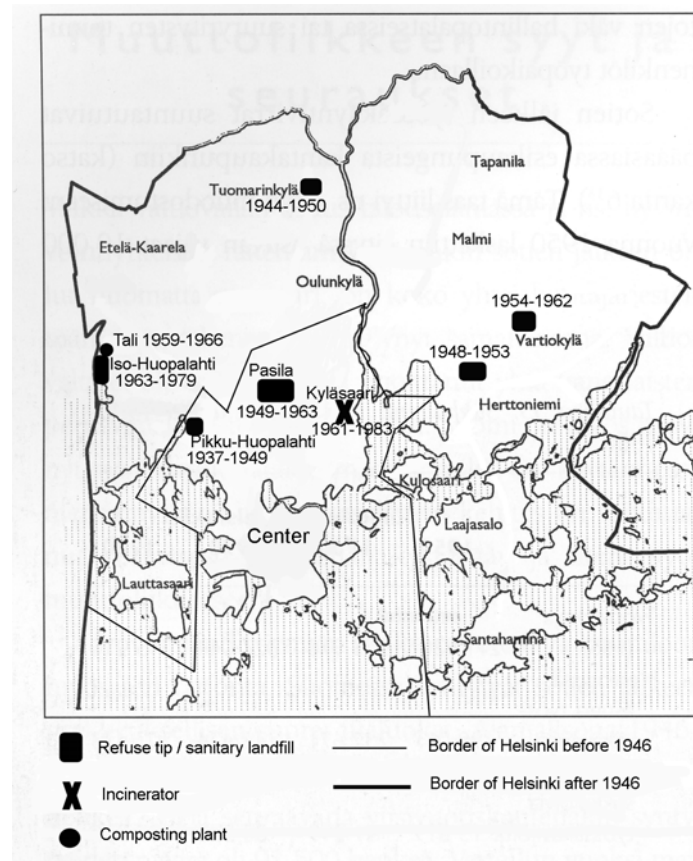


Figure 2: Helsinki and its waste disposal facilities during 1945-1983. (Modified from Leminen, Arovaara & Forss 1993; Turpeinen 1997, 13; 72).

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Incineration

In-situ combustion

Soon after the war single housing blocks in Helsinki changed their waste disposal technology to a small-scale incineration. It was seen as a hygienic and cheap method to dispose household waste. Mostly the blocks were equipped with a central heating system and some changed the furnaces simultaneously with the beginning of the district heating to an incinerator. The other option was to mason a waste furnace next to the central heating system and share the chimney. After the in-situ combustion only the ashes had to be transported away, what decreased the waste treatment costs of the households. The operation of the in-situ incinerators varied in different blocks. Some collected waste until the oven was filled with it and then burnt all at once, e.g. two times a day. Meanwhile others had practically a continuous fire in the oven; typically this was the case when the capacity of the furnace was too small. (Lindfors 1970, 349) The construction of in-situ incinerators was simple to blocks, as the permission from the building inspector was often given, or the incineration was seen as a part of normal measures for property care, which did not need any special permission. (CG 12.1.1961, Agenda, N:o 12) It has been calculated that there were at the most about 1500 in-situ incinerators in Helsinki (Lindfors 1970, 347).

In new residential areas built after the war the trend was to situate the block buildings in the open terrain. Backyards of quarters disappeared and with them the natural, hidden placement for the garbage containers. (Nygård 2001, 93-95) According to newspaper articles it seems that the collection methods and the ugly and unhygienic containers in the yards disturbed the people most. They resembled smelly refuse heaps and they caught flies and rats. (LS 4.1.1957). The old waste disposal technology did not respond to

the expectations of the people about urban, modern living and they insisted on the disappearance of the smelling and unhygienic piles of waste next to their homes. These conditions on the backyards of citizens necessitated the advocacy for incineration. During the 1950s the in-situ incineration was praised in the press. It was mentioned to be a “lucky solution for this property” and a crucial measure to improve the cleanliness in the neighbourhoods. (LS 4.1.1957) For individual blocks incineration had two major advantages: it reduced the transport costs for waste to a minimum and at the same time it improved the cleanliness of the yards close to the homes. Waste did not need to be stored for days anymore, but it could be disposed immediately. The Finnish Architect’s Association recommended in-situ-incineration heavily in the public and assured with reference to several investigations that in-situ incineration was perfectly hygienic and safe. (Koiso-Kanttila 1955, 11)

The city council took notice of the negative effects of in-situ incineration already in 1949 when the bad smells, especially at humid weather or times of depression, were brought up. (CC 14.12.1949, Documents, N:o 18) The Health Board received regularly complaints about incinerating causing smoke, bittersweet stench and ash, which intruded into yards and apartments. In the complaints it was mentioned that the stench of the combustion gases and smoke made ventilation from the yard-side windows impossible, soot dirtied drying clothing on the lines and charred pieces of paper etc. flew out of the chimney after incomplete burning. (HB, Annual yearbooks) The problem was especially harmful in the downtown area, where the closed construction method had led to the incinerators to be placed in the inner courts of quarters, where smoke and floating particles did not disperse and in unfavourable weather conditions stayed for long periods in the surroundings (CG 12.1.1961, Agenda N:o 12; Lindfors 1970, 349)

After a letter of complaint the Health Board sent an inspector to observe the chimney and measure the burning temperature and make a statement about the severity of the nuisances caused. If needed, additional statements from construction specialists were obtained. (e.g. HB 9.12.1959, 1028§). Every complaint had to be treated individually and nearly without exception the final decision was the denial of the use of the in-situ incinerator, if no additional equipment for increasing the combustion temperature was added. Practically this meant abandoning incinerating because the blocks were not willing or able to bare this kind of additional financial burden.

As a reaction to the complaints about the in-situ-incinerators a committee was set up by the authorities in 1961 to inspect the waste management in the city with a special attention to air pollution caused by incinerating. In its memorandum the committee confirmed that current air pollution from in-situ incinerators could be a health hazard and that the technology should be improved. New instructions were given and in-situ incineration became subject to license and a condition of a continuous combustion temperature of +800 °C was set for incineration. This led to a partly voluntary closure of in-situ incinerators or to closure by the order of the Health Board. Small-scale incineration disappeared from the city by the early 1970s. (Lindfors 1970, 349- 352)

Waste combustion plant

In 1949 the city council accepted the proposal of the public sanitation department to build a waste combustion plant to Helsinki next to a power plant. In 1949 the many advantages of waste incineration were presented. The main problem of scarcity of suitable land area for landfills would be solved and combustion would be the only method to face the future problems related to the increasing amount of waste – combustion lessened the volume of the waste drastically. At the same time incineration would be

beneficial in other ways as well. The nuisances caused by tipping were widely known and combustion could release the city from them in an effective way. The possibility to gain energy from the waste must have been an important aspect at times when energy consumption was still regulated in the aftermath of the war. One argument was also the international example. The proposal emphasized the trend of incineration in metropolises abroad, both in European countries as well as in the USA. As Helsinki was growing to be a metropolis as well, the solutions of other capitals could suit Helsinki, too, and incinerator used in Stockholm since 1938 served as the model for the solution in Helsinki. Before the plan was accepted in the council, the electricity company assured that an appropriately build incinerator does not cause any odours or other flaws as has been evident in incinerators abroad. Examples were brought up from cities, where the incinerator is located close to the city centre and no nuisances have occurred. It was added that with modern technical equipment all floating ash could be removed from the combustion gases. (BPS 19.9.1949, 1072§) The profitability calculations made for the incinerator and presented to the city council showed that despite of the high investment costs at the beginning, incineration would be cost-effective: compared to the costs for new landfills, their treatment and the transportation of waste, the investment in a combustion plant would bring the city a net savings of approximately 33 million marks every year. In addition to that the “hygienic rewards [of the incinerator] cannot be measured in money” it was said. (CC, 14.12.1949, Documents, N:o 18) The plan to build a combustion plant faced only weak opposition in the discussion. In the city council a few councillors questioned the planned place for the incinerator, not the technology itself. The only objection came from the side of the advocates for composting. (See subtitle “Composting”)

The construction of the incinerator was delayed, for several reasons: the call for tenders did not bring any answers (BPS, Annual ..1950, 317-321), the city had financial problems (LS 15.12.1957) and after a few years the planned location for the incinerator was not anymore available. The delay was criticised in the press, because the incinerator was hoped to bring relieve to the nuisances caused by tipping. When a suitable, new location for the incinerator finally was found in the district of Kyläsaari, a few kilometres north of the original placement, the expectations towards the advantages of incineration were increasing. (LS 20.4.1956). The area of Kyläsaari was an area 3 km north of downtown with small industrial activity and a sewage treatment plant. Residential areas were about 500 m to the south. The plant was completed and operation started in 1961. Since the obverses of in-situ incineration were acknowledged, centralised combustion in a designated plant was welcomed as an improvement to the air quality (Lindfors 1970, 352). The large-scale technology enabled a better control of the combustion process and also of the emissions. Also difficultly disposable waste, like oil products or waste from hospitals was burnt in the Kyläsaari-plant.

The combustion plant managed to handle about 60 % of the combustible waste in the 1960s but soon after that its share dropped to about 30 %. (BPS, Annual...) The plant was used also for energy generation, but its importance to energy generation decreased with the rapid increase of energy consumption. Its contribution to the production of heat to the district heating system dropped from about 7 % to 2 % within 20 years (EC, Annual reports). Figure 3 presents the increase of total waste in Helsinki and the proportions disposed on tipping sites and incinerated.



Figure 3: Total waste and the shares of waste disposed by tipping and incineration during 1945-1980. (BSP, Annual Yearbooks 1945-1980) (For the estimation of total waste: see Fig.1)

The trend of increasing waste amounts led to the operation of the plant at the upper limits of its capacity. Also the technological equipment aged and the combustion process was not anymore optimal. Because landfill area was rare, the combustion capacity of the plant was permanently exceeded, which made the combustion process worse. During the 1970s nuisances of smoke, soot and stench increased and gained publicity and suspects about possible health hazards were uttered. (Rantala 2002, 269)

In 1979 a plan of enlarging the capacity of the plant threefold became public and strong civic activity rose to oppose the incinerator. With the prime motivation coming from a district grouping a group of citizens joined forces and established a movement, which drew public attention to the ill effects of the incinerator. Two completely conflicting viewpoints about the future of incineration collided: the city authorities, who pursued the intensification of the role of incineration as a waste disposal method, and the citizens, who aimed the cessation of incineration completely. Over a period of three years activity and pressure measures to oppose the plan and to draw attention to the subject were organised. The variety of activity included evening parties with prominent performers, slide shows, press conferences, the collection of a petition with nearly 15 000 names and the compilation of an alternative waste disposal plan for the region. The relations between the civil movement and the city authorities tightened and the edges of pertinence in discussion were often approached. (Rantala 2002, 269-275) Finally with a decision of the Health Board the incinerator of Kyläsaari was determined to be closed by March 1983 (HB, Annual.1982, 6) and it is considered as a major victory of civic activity to oppose polluting operation. The activity was given several recognitions for its achievements in environmental protection, e.g. by the Nature Conservation Association of Helsinki and the Association for Community Planning. Because of missing permissions of placement the deputy mayor and the city engineer were given judgement of a severe waste management

crime. Five years after the closure of the plant, its chimney was exploded and since 1990 a recycling centre has been functioning in the building. (Rantala 2002, 275-277).



Figure 4: Waste is being brought to the waste cleft of the waste combustion plant of Kyläsaari in 1976. Foto: Erkki Salmela, HCM.

Composting

While the construction of the combustion plant was delayed also the objection to the idea of combustion of waste had occurred. In the early 1950s the advantages of mechanical composting were brought up in an article (Rautavaara 1950) and by the Gardening Society of Helsinki (Helsingin Puutarhaseura). The main argument was the reusability of waste after composting for soil enrichment and fertilizing purposes. Especially a rather new Danish invention of the DANO-composting method was preferred. They wrote that waste disposal is not a mere hygienic and technical, but also an economic question. In their view waste was too valuable to be used as a fuel. The main suggestion of the advocates for composting was to drop the incineration plan and build the waste disposal system of the city to rely on mechanical composting instead of incinerating.

The suggestion was rejected because there was a strong suspicion that the market for this Dano-fertilizer was not big enough and the city would soon have to store large amounts of it. (CC, 14.12.1949, Documents, N:o 18) The cost-effectiveness of the composting plant was doubted and also its capacity to handle the increasing amount of waste did not seem secured. There was hesitation because the technology of mechanical composting was rather new and unknown weaknesses could possibly show up. It was admitted that composting might be a good disposal method in the future but it needed more investigation and small scale testing before extensive use. The method was not objected by definition, only the idea of it as the exclusive solution for the waste disposal in Helsinki. Therefore the department hastened the building of the incinerator but suggested at the same time that one Dano-composting plant could be built. (BPS 13.2.1956, Agenda, N:o 5).

The decision about the building of a Dano-plant for solid waste and sludge was made, and it started operating in 1959 in the western part of the city (Tali). From the beginning the product compost included

e.g. glass, so that the quality requirements for its use were not met. (Helsinfors...1960, 187) Only after a few years this mechanical composting plant was being announced as a mistake. Its contribution to the treatment of solid waste in the city remained rather small (20 000 m³ at the highest, compare to Fig. 3), its operating costs exceeded the estimates and the produced compost soil was of poor quality and there was no demand for it. Also its operation was not as imperceptible as hoped: its stench caused complaints from the neighbouring residential areas. Only after seven years of operation the composting plant was closed in 1966 (Leminen, Arovaara & Forss 1993, 14). Mechanical composting of mixed waste failed and at that time the idea of separating biodegradable waste to assure the quality of the compost was lacking. The time was not yet ready for sorting of waste according to its best possible use value. Composting of separately collected organic waste started in the capital region of Helsinki in 1993.

Waste disposal technologies and air pollution

In the debate about the suitable technology to manage solid urban waste in Helsinki environmental aspects were significant. The used terminology did not in the beginning include environmental protection in the present meaning, but the aims fulfil the characteristics of modern environmental protection. The main problem was human activity, which caused degradation of the environment, which in turn affected the wellbeing of citizens in a negative way.

The early method of storing waste on open dumps or badly treated tipping sites was objected unanimously because of the negative consequences to the surroundings. The failure of composting in Helsinki was due to double-faced problems: mainly the uneconomical operation, but partly the nuisances to the neighbourhood. After the worst faults of tipping sites were bypassed, the main concern of air pollution was directed to incineration.

In-situ incineration had controversial effects. It lessened one environmental problem, the dirtiness of yards caused by improper collecting and storage facilities of waste. On the other hand it caused severe, local air pollution. Investigations made about the air pollution effects of incineration attested that small-scale combustion hardly met the recommended combustion temperatures and produced multifold emissions compared to centralized incineration. Compared to other pollution sources in Helsinki as a whole, incineration of waste was considered as a rather small problem, constituting less than 5 % of the total air pollution load. (Laamanen and Noro 1967a, 7-8; 19) The noteworthy aspect is the extreme locality of incineration-caused air pollution and the circumstance that it occurred in residential areas, in the yards, in the middle of every-day life of ordinary citizens. The poor ventilation and certain weather conditions in the yards kept emissions for a long duration in the instant exhaling area. The air pollution problem was considered so harmful and inconvenient that the city's committee recommended the abandonment of that technology. Later also the Institute for Occupational Health which was the first institution to start regular research on the air quality in Helsinki declared that incineration should be limited to plants where the facilities secure optimal combustion: all other forms of incineration are a considerable threat to the environment and as a consequence to people. (Laamanen and Noro 1967b, 32)

The combustion plant of Kyläsaari doubtlessly decreased air pollution caused by the in-situ incinerators. According to the studies of the Institute for Occupational Health the switch from in-situ-incineration to a centralized waste burning plant did improve the air quality in Helsinki. The same report from 1967 however presented also the ill effects of combustion plants to the environment. The sulphuric and nitric oxide emissions were emphasized and the experts stressed the obligations that combustion plants must

meet in order to be environmentally acceptable. (Laamanen and Noro 1967a, 7-8) In the 1970s also the emissions from the plant gained more attention and scientific research about them was made. Next to the nuisances, which were perceptible to all close city dwellers, also measurable information was published. In 1974 a lead investigation discovered that up to 3 kg of lead was emitted hourly from the plant. (Mattsson and Jaakkola 1974, 14) Five years later it was postulated that nearly all cadmium in the air of Helsinki was originating from Kyläsaari (Mattsson and Jaakkola 1979, 12). The problem was not anymore only the unease of the closest districts because whenever the wind blew from the north or north-east, the smokes and heavy metal emissions of the incinerator were drifting on the residential areas and downtown as well.

In the 1970s a committee was set up by the national authorities to discuss the need for a toxic waste disposal plant. The proposal included the suggestion of enlarging the incinerator to handle toxic waste from whole southern Finland. The city council objected this proposal with the argument that the incinerator of Kyläsaari already caused too heavy nuisances and that the consequences of burning toxic waste were unpredictable. The council approved a resolution, which prohibited the placing of such activity in the area that causes air pollution, dirtiness or deterioration of the environment. This included also the rejection of the placement of the toxic waste disposal plant in the city. It was said that the closest district should not anymore face more ill effects caused by the waste disposal facilities. (CC 10.3.1976, Minutes, 154§) The decision in principle of the city council from 1976 acknowledged the environmental problems caused by Kyläsaari on an official level.

Joel A. Tarr (1996, 271-272) has come out with four different methods that are available to a society to deal with technology-induced air pollution: the “human-fix”, retrofitting the technology to a less polluting mode, the switch of fuel and changing of the technology to a less polluting one. In the case of incineration of solid waste in Helsinki some of these were tried. Before the in-situ incinerators were closed directions for the caretakers of the furnaces were given with the aim to decrease emissions and nuisances. They were told to restrict the burning to night-time only, when the fumes did not disturb the neighbours and to instruct the households not to bring waste to the furnace continuously but to burn everything at once, with better heat. The demand of retrofitting the in-situ incinerators with additional equipment to improve the combustion process turned out to be too expensive. As a consequence the change of technology, from small-scale to large-scale combustion in a designated plant was tried. The change of fuel was only limitedly possible, but the addition of coke to the combustible material if necessary in Kyläsaari was mentioned. All the measures taken were not sufficient for the opponents of incineration and air pollution was the underlying cause for the closure of the incinerator.

The change in attitudes towards incineration must be seen in the larger context of the development. In-situ-incineration proved to cause too much problems in the local environment and the shift to centralized incineration removed local air pollution from several surroundings and backyards. During the years between the starting of the Kyläsaari plant and the late 1970s the awareness about environmental hazards had increased and good environmental quality had become a value itself. Environmental issues were more largely under debate in society and attitudes towards pollution and environmental degradation changed. Even if emissions did not occur straight under one’s own window, pollution became unjustifiable in the public. Increased knowledge and awareness about pollution led to stricter demands than before. One sign of the overall increased awareness of environmental problems is the fact that in the decades straight after the war environmental concern was mostly related to the problems, which are directly perceptible by citizens. It was shown that later also the possibility of environmental degradation and not directly perceptible hazards raised concern. Increased knowledge and research about environmental and health

hazards caused by incineration added to the fact that attitudes towards incineration from positive to negative. Incineration had no advantages that could not be achieved with the sanitary landfill and the negative side effects of combustion became dominant.

Conclusion

The mode of construction of urban infrastructures must be considered case-specifically keeping in mind the special features of each city and it is difficult to make general statements. However in the waste management case in Helsinki one can stress some aspects. After the Second World War the city authorities in Helsinki were facing a problem with urban waste disposal, which needed the implementation of new technologies after the prevailing open dump-system was not anymore acceptable or satisfactory. The choice was to be made between three technologies, although they were not excluding each other. Waste management and environmental issues, especially air pollution, have been linked together in post-war Helsinki. The waste disposal technologies used in Helsinki have had an impact on the quality of the environment and the concerns about environmental harms caused by waste disposal have influenced the decision-making about which technologies should be used.

The decentralisation of disposal methods on more than one technology has proved to be flexible and capable to adapt to changing societal circumstances and to respond to increased knowledge about the environmental effects of the different technologies. From the two technologies operating simultaneously in Helsinki the one, which could be modified effectively and economically to the changes in the amounts of waste, public attitudes and regulatory context, survived. This proved to be important because of the nature of planning urban infrastructures as long-term decisions which need a reasonable perspective for future development.

In the case of incineration in Helsinki the environmental aspects were not sufficiently examined or even ignored by the time of its implementation and later the demands for environmental quality had increased more than could be met by the technology. Also the deficiencies in communication between the counterparts must be mentioned. The city authorities lacked a sensitive ear for the public opinion and the utterances of concern. Incineration had caused environmental hazards before, but the every-day perceptions of citizens experiencing the nuisances were rejected by the decision-makers. Environmental concern as an agent, which should be taken into account in the construction of urban infrastructures, was neglected, which in turn led to confrontation. A more cooperative way of planning and open discussion about options would lead to more sustainable and acceptable solutions. Incineration has experienced a shift from favour to disfavour within two decades. Meanwhile the dump has shifted from extreme disfavour to the sanitary landfill and the lesser of two evils and it has been accepted as an unavoidable irritant. Mechanical composting had a minor role in the overall system and it proved very quickly to be both technically and economically unsuitable and it must be seen as an unsuccessful test to apply new technology.

The closure of the combustion plant in Helsinki 1983 meant a return to a single method infrastructure in waste disposal. The key to solve the prevailing problem about scarce landfill area was to be solved with regional cooperation. Also recycling and the aim to lessen the amount of waste produced became a means to approach the waste problem. At the present guidelines about the possibilities of waste disposal are matters of the EU and soon important decisions about future technologies are going to be made.

Notes

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Used abbreviations: BPS Board for Public Services (Yleisten töiden lautakunta), CC City Council of Helsinki (Kaupunginvaltuusto), CG City Government of Helsinki (Kaupunginhallitus), EC Electricity company (Helsingin sähkölaitos), FD Fire Department (Paltoimi), HB Health Board (Terveydenhoitolautakunta), HCM Helsinki City Museum, LC Landfill committee (Kaatopaikkakomitea), LS Liitosalueen Sanomat (A weekly published newspaper of the joint area).

References

(All archive material originals, newspaper and journal articles in Finnish or Swedish, the archive material is indicated in English translation by the author for clarification purposes, Finnish original in parentheses)

Archive source material (Helsinki City Archive)

Board for public services: Minutes of meetings, Agendas, Appendices.

City Council of Helsinki: Agendas, Proceedings, Appendices.

Health Board: Proceedings, Appendices.

Landfill committee: Documents (1963-1973), (Kaatopaikkakomitea) Komiteat N:o 347.

Published documents of the city of Helsinki

Annual municipal report I and II 1945–1983 (Kertomus Helsingin kaupungin kunnallishallinnosta I ja II).

Board for Public Services, Annual reports 1945–1983, in Annual municipal report II (Yleisten töiden lautakunta, vuosikertomukset 1945–1983, in Kertomus Helsingin kaupungin kunnallishallinnosta II).

City Council, Documents of the City Council, Proposals of the City Government and the resolutions of the City Council (Helsingin kaupunginvaltuuston asiakirjat, Kaupunginhallituksen ehdotukset ja kaupunginvaltuuston päätökset).

City Council, Minutes of discussion (microfilm) (Kaupunginvaltuuston keskustelupöytäkirja).

Electricity company, Annual reports 1960–1983, in Annual municipal report II (Sähkölaitos, vuosikertomukset, in Kertomus Helsingin kaupungin kunnallishallinnosta II).

Fire Department of the city of Helsinki, Annual reports 1945–1983, in Annual municipal report II (Paltoimi, vuosikertomus, in Kertomus Helsingin kaupungin kunnallishallinnosta II).

Health Board, Annual reports 1945–1983, in The statistics of the city of Helsinki I, Preceding part, Health care (Terveydenhoitolautakunta, vuosikertomukset, in Helsingin kaupungin tilasto I, edellinen osa, Terveyden- ja sairaanhoito, vuosikertomuksia).

Memoranda of the City Government (Kaupunginhallituksen mietinnöt).

The statistical yearbook of the city of Helsinki 1945-1983 (Helsingin kaupungin tilastollinen vuosikirja).

Literature

- „Helsingfors komposteringsanläggning vid reningsstationen i Tali“ 1960. (author not indicated), *Finsk kommunaltidskrift* 5/1960: 186-187.
- Herranen, T. 1997. Kaupunkisuunnittelu ja asuminen. In: Turpeinen, Oiva, Herranen, Timo & Hoffman, Kai (Eds.) *Helsingin historia vuodesta 1945*. Helsingin kaupunki.
- Jokinen, Kimmo and Saaristo, Kimmo 2002. *Suomalainen yhteiskunta*. WSOY, Porvoo.
- Koiso-Kanttila, E. 1955. Arkitektförbundet förordar förbränningsugnar för avfall. *Finsk kommunaltidskrift* 1/1955: 11.
- Kruut, M. 1998. Kivihülsävua vastaan. Helsingin ilman epäpuhtaudet sekä ilman pilaantumisesta käyty yleinen keskustelu 1880-luvulta 1920-luvulle. Masters thesis (unpublished), Department of History, University of Helsinki.
- Laakkonen, S. 2001. Vesiensuojelun synty. Helsingin ja sen merialueen ympäristöhistoriaa 1878-1928. Gaudeamus, Helsinki.
- Laakkonen, S., Laurila, S., Kansanen, P. & Schulman, H. (Eds.) 2001. Näkökulmia Helsingin ympäristöhistoriaan. Kaupungin ja ympäristön muutos 1800- ja 1900-luvuilla. Helsingin kaupungin tietokeskus.
- Laakkonen, S., Laurila, S. & Rahikainen, M. (Eds.) 1999. Nokea ja pilvenhattaroita. Helsingin ympäristö 1900-luvun vaihteessa. Helsingin kaupungin museo, Narinkka 1999, Helsinki.
- Laamanen, A. & Noro, L. 1967a. Helsingin ilman saasteen lähdeyhtymäkatsaus ja siihen liittyvät kaupunkikohtaiset ilmansuojelunäkymät. Työterveyslaitoksen julkaisuja N:o 34. Helsinki.
- Laamanen, A. & Noro, L. 1967b. Helsingin ilman leijuvat ainekset. Katsaus v:lta 1959...1965. Työterveyslaitoksen tutkimuksia N:o 30. Helsinki.
- Leminen, K., Arovaara, H. & Forss, P. (Eds.) 1993. Helsingin jätteenkäsittelyalueet. Helsingin kaupungin ympäristökeskuksen julkaisuja 11/1993. (The waste treatment areas in Helsinki. In Finnish).
- Liitosalueen Sanomat (Newspaper of the joined areas).
- Lindfors, P. 1970. Kiinteistökohtaisten jätteenpolttouunien rakentamisesta ja haitoista Helsingissä. *Ympäristö ja terveys* 5/1970: 347–352.
- Mattsson, R. & Jaakkola, T. 1974. Helsingin ilman lyijypitoisuudesta. *Ympäristö ja Terveys* 8/1974: 2-16.
- Mattsson, R. & Jaakkola, T. 1979. An analysis of Helsinki Air 1962 to 1977 based on trace metals and radionuclides. *Geophysica* 16 (1): 1-42.
- Melosi, M. 1981. *Garbage in the cities: refuse, reform and the environment 1880-1980*. Chicago, Dorsay.
- Melosi, M. 2000. *The Sanitary City*. The Johns Hopkins University Press.
- Nygård, H. 2001. Kompostoida vai polttaa? Keskustelua jätteenkäsittelyn vaihtoehtoista 1950-luvulla. In: Laakkonen, S., Laurila, S., Kansanen, P. & Schulman, H. (Eds.), *Näkökulmia Helsingin ympäristöhistoriaan*. Helsingin kaupungin tietokeskus, Helsinki.
- Rantala, T. 2002. Kyläsaariliike ja piipun kaataminen. In: Korhonen, E. & Tikkanen, S. (Eds.), *Tanssiva katusulku. Kestävän kehityksen tositarinoita Helsingin seudulta*. Uudenmaan ympäristönsuojelupiiri ry ja Ympäristö- ja kuluttajapolitiittinen yhdistys ry. Kustantaja Sarmala Oy / Rakennusalan kustantajat.

- Rautavaara, T. 1950. Nya perspektiv för användningen av renhållningsavfall. *Finsk kommunaltidskrift*, 7/1950: 164–167.
- Starck, W. 1958. Oskadliggörandet av städernas avfall. *Kunnallistekniikka* 2/1958: 195-201.
- Tarr, J.A. 1996. *The Search for the Ultimate Sink. Urban Pollution in Historical Perspective*. Series: Technology and the Environment. The University of Akron Press, Ohio.
- Turpeinen, O. 1995. *Kunnallistekniikkaa Suomessa keskiajalta 1990-luvulle*. Gummerus, Jyväskylä.
- Turpeinen, O. 1997. Väestö. In: Turpeinen, O., Herranen, T. & Hoffman, K. (Eds.) *Helsingin historia vuodesta 1945*. Helsingin kaupunki.
- Väestökeskuksen jätehuolto (1969), Suomen kunnallistekninen yhdistys, Publication N:o 13.

