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The Political Economy of Waste Management in Japan

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This paper analyses the issue of waste and waste disposal which faces present-day Japan, with special regard to the political economy of the following topics :

- (1) the illegal dumping of waste and environmental pollution,
- (2) the revision of the law concerning waste disposal and public cleansing
- (3) an account of the law for the promotion of the sorted collection of waste and the recycling of containers and packaging
- (4) an economic analysis of possible garbage charging systems
- (5) pollution caused by chlorinated dioxins and related compounds
- (6) the transboundary movement of hazardous waste

For the solution of the problems it is necessary to change the social system as well as the introduction of new technology.

1. Introduction

One of the biggest social problems facing present-day Japan is the issue of waste and waste disposal. Needless to say, many of the safety hazards which have resulted from the siting and conduct of waste disposal sites remain a present danger to the environment and the people. Three particularly troublesome sites are representative of these problems : Teshima Island in the Seto Inland Sea, which is notorious for the illegal dumping of industrial waste, Mitake Town in Gifu Prefecture, which is used as a site for the disposal of industrial waste, and Hinode town in Tokyo where the safety of municipal waste disposal has been called into serious question. Such instances of environmental pollution are the result of a number of related causes : the choice of landfill disposal sites, disputes over siting, shortage of suitable sites, the burden on the local government, dioxin (PCDDs/Dfs) pollution arising from the use of domestic waste incinerators, even the newly introduced "Law for the Promotion of Sorted Recycling of Containers and Packaging".

I therefore need to elucidate the nature of waste disposal in Japan by first considering the relevant issues that must be taken into account if the problems are to be overcome. Japan imports at relatively low prices and consumes in a regularly wasteful manner approximately one third of the raw material and resources that it uses. Waste is classified roughly into two types : domestic waste and industrial waste. The domestic consumption of raw materials and resources amounts to about four tons of waste per person annually, while industrial waste in 1994 amounted to

about 400 million tons, which is between 80 to 90 percent of the total quantity of waste. 19 kinds of industrial waste have been classified, and those which are classified as "injurious to human health and the living environment" are located in specially managed sites. Unfortunately, the 19 specified items do not cover every kind of industrial waste: the list ignores, for example, the pollution of surplus soil.

The official figures given for industrial waste in 1994 have been listed under three headings: sludge 45%, animal excrement 18%, construction waste 15%. In fact, the amount of construction waste is greater than this since the figures do not take into account the weight of dehydrated sludge. While about one-fifth of all the industrial waste produced is disposed of, the amount of waste recycled has reached a ceiling of about 40%.

In recognition of the differences between disposal facilities, landfill sites are divided into three types. The 1995 figures for their numbers are: 1, the least controlled landfill sites, 1,653; 2, controlled landfill sites equipped with a liner, 988; and, 3, strictly controlled landfill sites encased in concrete, 40.

Recently, dust from shredded automobiles has been dumped in one of the least controlled sites, while the latest survey of the Environmental Agency has revealed that heavy metals, carcinogenic substances and other hazardous materials have been detected in one third of all the least controlled landfill sites. Although a 1997 revision of the "Waste Disposal and Public Cleansing Law" prohibits the disposal of municipal solid waste in sites without a liner or a wastewater treatment facility, old landfill sites that had been established before the revision have not yet been properly regulated. A 1997 investigation carried out by the Ministry of Health and Welfare established that, at that time, 538 landfill sites (30% of the total) were excavation landfill sites without timbering, nor were they equipped with either a liner or wastewater treatment facilities. At the same time, evidence shows that even in controlled landfill sites, torn vinyl and gum liners can still cause geo-pollution. This has focussed attention on the safety of the final disposal sites.

2. The Illegal Dumping of Waste and Environmental Pollution

The illegal dumping of a massive amount of waste at Teshima Island in the Seto Inland Sea raised the issue of accountability: who, that is, should be held responsible for the environmental pollution caused by the illegal dumping of waste and who should bear the cost of cleaning it up? An investigation by the Environmental Dispute Coordination Commission discovered that the waste illegally dumped at Teshima Island contained such hazardous materials as lead, PCB, and dioxins (PCDDs/DFs). The area of waste covers 460,000m² and 87% of this area falls outside the limits established for the permitted dumping of hazardous waste. At the same time, not only lead and benzene but also dioxin were found in the groundwater in quantities exceeding the legal criteria of permitted levels. Although no obvious traces of

pollution in the subsoil or in the creatures living on the sea bed have been detected, there can be no doubt that hazardous waste matter will have been leaking through the flow of groundwater into the sea.¹

The origins of the illegal dumping at Teshima Island can be traced back to 1975 when the company responsible applied for permission to operate a hazardous waste management disposal business. In 1977, the company modified its application so that it could operate an intermediate disposal business in order to cultivate earthworms in the sludge for the production of a soil conditioner. In 1978, the Kagawa Prefectural government granted the company permission to do this. In 1983, the Prefectural Public Safety Commission also gave the company permission to organize a scrap metal business authorised to haul shredder dust, waste oil and sludge as well as to run landfill operations and carry out open burning. The company, however, also carried out open burning of unauthorised waste, and as the volume of waste being hauled continued to increase, the Hyogo Prefectural Police became suspicious that the company was violating the "Waste Treatment Act" of 1990, which had been designed to end the excessive movement of waste, landfill treatment and open burning.

Although the company complied with the orders of the Kagawa Prefectural government to remove the dumped waste and install prevention equipment to prevent the outflow of litter, a good deal of waste matter was left behind. 549 inhabitants of Teshima Island requested the right to question 21 producers (also here called "generators") of waste, while in 1993 the Kagawa Prefectural government asked the Environmental Dispute Coordination Commission to mediate between the company and the residents who were asking not only for the removal of waste but also for compensation for the damage caused. In 1996, the Takamasa District Court gave a decision in favour of the local residents who had brought a case to request the removal of waste and to ask for compensation.

The point at issue is the responsibility of the three bodies who can be held accountable: the producers/generators of the waste, the waste disposal company, and the local government, in this case the government of Kagawa Prefecture.

1 M. Hanashima, T. Takatsuki, and O. Nakasugi, (1996), "A Case Study of Environmental Contamination Caused by Illegal Dumping of Hazardous Waste," *Waste Management Research*, Vol. 7, No. 3, p.4.

As to Teshima Problem, see to "Commander of the field Battle, Koh-hei Nakaboh," NHK Publisher, 1997, Chapter 4.

In a series of articles printed during the November and December of 1997, the Chunichi Newspapers reported that shredder dust had been illegally dumped in the eel-farm waters at Tawara town, Aichi Prefecture. In October, 1997, the same newspaper ran a waste problem campaign under the title "What shall we do about the Garbage Archipelago?" The paper claimed that evidence now exists to confirm that the central part of Honshu has been thoroughly polluted by the dumping of construction waste, the open burning of pinball machines and the misuse of self-disposed landfill sites.

Since the original "Waste Disposal and Public Cleansing Law" proved inadequate as a means to counter the waste disposal company's attempts to evade the issue by arguing that shredder dust was not industrial waste since it still contained valuable products, such inadequacies in the Law left room for the administration to interpret its terms in an arbitrary manner. Consequently, the formula "since the law is defective, the government can take no action and the business involved cannot be held responsible" has, naturally enough, simply enlarged and extended the problem.

In July, 1997, however, the Kagawa Prefectural government did come to an intermediate agreement, and admitted that they had made a mistake in giving permission to the waste service company, while expressing their regret at what had happened. At the same time, they made a decision in favour of an intermediate disposal of waste. This, however, was far from satisfying the local inhabitants who had asked for the complete removal of waste, nor were the inhabitants pleased that there was no mention of the generators' responsibility for what had happened to the affected residents or any recognition that the free offer by the government of their land had been a precondition for the establishment of the disposal facility site. With financial help from the national exchequer, the Kagawa Prefectural government proposed to spend more than approximately 15 billion yen for the clean-up.

Although the producers of the waste were well aware that the waste disposal enterprise had been disqualified from conducting its business, – the generators of the waste – had nevertheless hired the unauthorized disposal business because of its lower than average charges. Although the wording of the law is, in this instance, clear enough, "to force the solvent generators to bear the burden", the biggest problem for the future is how much the generating enterprise will actually be able to pay. Although most of the 21 generators expressed their intention of bearing the disposal cost on the pretext that it was "settlement money", this amounts to nothing more than a contribution to the cost of the clean-up.

3. Revision of the Waste Disposal and Public Cleansing Law

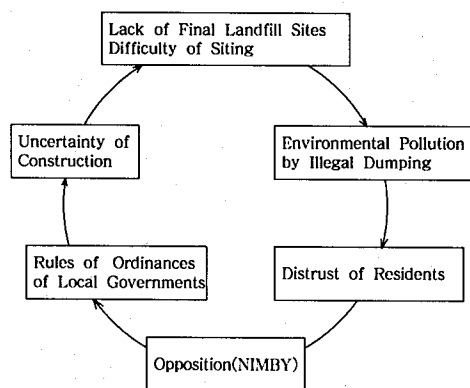
The original law, the fundamental law regarding the disposal of waste in Japan, was originally passed in 1971. In 1991, it was revised. Although the following items were submitted by the Health and Welfare Ministry Living Environment Council as necessary features of the revision, their aims have remained unrealized.

- 1 The producer/generator is responsible for waste that is difficult to dispose : afterward such waste is limited to four kinds.
- 2 The producer/generator must take the responsibility if the waste is dumped illegally.
- 3 Resource recycling businesses should be subsidized.
- 4 The terms of the law must accord with the Basel Convention, which set limits for the transboundary transfer and disposal of hazardous waste.

The more difficult it becomes to find and construct a landfill site, the more urgent have become requests by the public that the "Waste Disposal and Public Cleansing Law" should be revised. In September, 1996, the Special Committee on Industrial Waste in the Living Environment – set up by the Ministry of Health and Welfare – published its report "The Fundamental Direction of Countermeasures to Cope with Industrial Waste". The basic problem of industrial waste disposal, said the report, was that waste disposal was caught in a "vicious cycle": although it was desperately urgent to create new final landfill sites, it was increasingly difficult to find them.

The committee argued that within two to three years at the most, all the existing landfill sites throughout Japan would be full. Illegal dumping, of which there are as many as 350 cases a year, aggravates the already severe state of present-day environmental pollution, while local residents are distrustful of and hostile towards the construction of new landfill sites, even when they are authorised. During the last ten years in Japan, 220 local disputes over the siting of disposal facilities have been officially registered. In October, 1997, Prof. Masami Taguchi of Rissho University reported the results of his investigations into these cases and came up with the much greater number of 950 all told. In order to fulfill the ordinances to establish a landfill site, the local inhabitants have to agree, but owing to their suspicion that the construction of the sites will cause a deterioration of the environment they have disputed the proposals (and generally rejected them), thus making it both more urgent and more difficult to construct final landfill sites. The prospect of further construction of sites remains unclear. (See Fig. 1.)

Fig. 1. "Vicious Cycle" of Industrial Waste Disposal



Source) Report of Health and Welfare Ministry Living Environment Council,
"The Fundamental Direction of Countermeasures to Cope with Industrial Waste," 1996.

The Bar Association of the Kanto District, however, disputed the opinion that the cause of illegal dumping was a shortage of final landfill sites: they insisted that

these sites still had considerable capacity for further occupation. In their view, waste was being dumped illegally in order to cut down on the cost of the "treatment fee".² The problem, they argued, is money: the waste disposal enterprises seek to increase profits by reducing costs by applying the principle "savings in application of constant capital".

The report of the Ministry Committee suggested the following four measures to counter the "vicious cycle":

- 1 Promotion of waste reduction and recycling ;
- 2 Improvement of safety standards and a recovery of public trust in the legal treatment of industrial waste : by strengthening the standards, by permitting the creation of mini-landfill sites, and by the full public disclosure of all relevant information ;
- 3 Enforcement of countermeasures against illegal dumping by strengthening the penal regulations and by enriching the existing system ;
- 4 Establishment of a system to provide the necessary funds to restore polluted land to its original condition, along the lines of the "Superfund" for restoration purposes.

The report, however, says nothing whatever about the costs to be incurred by the producer/generator of the waste, the disposal business, or the local government.

Meanwhile, the Japan Bar Association produced its own report on the revision of the "Waste Disposal and Public Cleansing Law". The report stated that the creation of final landfill sites was not by itself sufficient to address the problem: it was necessary to pursue the generator's responsibility as a factor in a society newly-committed to the circulation of resources. It would also be necessary to establish a quantitative regulation to grant custody to an intermediate facility, thus aiming to abolish an under-limit on landfill sites and so establish a closed system for the disposal of hazardous wastes. The report also argued that the generator should be required to donate a fund for restoration and compensation, and that where illegal dumping had occurred the local government should have the authority to issue an order to restore sites to their original condition. It also insisted that no waste disposal facility should be sited anywhere near a headwater reservation area, that information about siting should be publically disclosed, that local inhabitants should have the right to operate a surveillance system to monitor the sites, and that the construction standards for final landfill sites should be reconsidered.

"The Waste Disposal and Public Cleansing Law" was revised in 1997. It included the following features :

2 Bar Association of Kanto District, (October of 1996), "Report: Toward the Revision of Waste Disposal and Public Cleansing Law."

An investigation carried out by the National Police Agency's Bureau for Safer Living (1997) claims that 65% of criminal instances of illegal dumping of industrial waste are motivated by the need of reduce costs.

Procedures for siting must be clarified through adoption of EIA (the Environmental Impact Assessment process). (The installer of the facility must carry out an investigation into the influence of the facility on its immediate environment, while the local governor must publish the results of the investigation and hold a hearing to consider the opinions of those affected, both government and stakeholders, before permission can be given to construct a landfill site.)

The management record of the disposal facility must be made public. (The installer of the disposal facility has also to keep a record of the management and maintenance of the facility and again, according to certain terms, must make this record public.)

The appropriate operation and maintenance of the final landfill site must be secured. (The installer of the controlled final landfill site bears the cost of the operation and maintenance during the period of the landfill.)

The penal regulations for the illegal dumping of industrial waste must be strengthened. (A maximum fine of ¥100 million to be imposed upon anyone judged guilty of illegal dumping.)

Illegally dumped waste must be dealt with appropriately. (The business world and the government must donate/create a fund to cover the expenses for the disposing of the unknown dumper's industrial waste.)

The revised law has been criticised, however, on several counts. The responsibility to be borne by the generator of the waste has actually been reduced, rather than extended. The fund to restore land damaged by illegal dumping depends entirely on voluntary contributions. The opinions of the interested groups – the local government, the affected parties, the specialists – are granted no more than a hearing. No regulations are imposed upon siting. As far as reducing disputes over industrial waste goes, 60% of all local governments consider the revised law useless.³

So, what is the reason why, in spite of all the revisions to the "Waste Disposal and Public Cleansing Law", a radical solution has not yet been found? My own opinion is that the existing Law and the general administration of waste control as sponsored by the Ministry of Health and Public Welfare is fundamentally flawed.

Under the direction of the Ministry of Health and Public Welfare, the Japanese government's administration of the public cleansing services has focused on the prevention of infectious diseases, and to achieve this end incineration has been regarded

3 The source is "the Nippon Economic Newspaper" (Japan's "Financial Times"), on April 9th, 1997. On December 26th, 1997, the Director of Water Works and the Environment, on behalf of the Ministry of Health and Welfare ordered local governments to re-examine how far the local by-laws had been applied in practice, over and above those regulations whose first requisite for the granting of permission to contractors for the construction of landfill sites is to seek for and to obtain permission from residents in the area before construction work can begin. About 70% of Prefectures had made the requisite arrangements for seeking and obtaining the local residents' permission to construct sites.

as the most effective method. Subsequently, in order to enlarge his market, the refuse facility manager took advantage of the public tendency to throw away domestic garbage as nothing more than "obsolete scrap". The resultant cost of disposal, about five times as high as that for the disposal of industrial waste, has been covered by tax rather than by the producers or removers of the waste. (This does not, however, imply that the disposal of *industrial* waste is perfect either.) As a result of these discrepancies, large scale incineration operations carried out by the public cleansing service have led to dioxin pollution, landfill sites are now about to overflow, and very slow progress has been made in efforts at recycling.

Japan relies on obtaining raw materials still obtainable from abroad at low prices. While this is so, and while Japan has lax criteria for waste treatment, and for the construction, operation and maintenance of disposal facilities, there has been little need to cut down the environmental load or conserve depleting resources, and so little progress has been made in the reduction or recycling of waste matter. To overcome this inertia, it has been proposed as a measure of ecological financial reform that a tax should be laid on virgin materials and that the recycling of waste matter should be subsidized. Along the lines of the American RCRA (Resource Conservation and Recovery Act), Superfund (CERCLA, the Comprehensive Environmental Response, Compensation and Liability Act), and the German Soil Protection Law (Bodenschutz Gesetz), strict criteria for the construction, operation and maintenance of disposal facility constructions needs to be laid down, while a system to fix the responsibility of the producer/generator must also be established. This has to be done to protect the soil and the groundwater, as well as to reduce and recycle waste.

Once this framework has been put into place, it will be necessary to integrate the present Japanese waste administration systems under a different control from those that operate at present: the "Waste Disposal and Public Cleansing Law" which is under the control of the Ministry of Health and Welfare while the "Recycling Law" and the "Law for the Promotion and Utilization of Recyclable Resources" is under the control of the Ministry of International Trade and Industry. One instructive model is a policy run by the OECD: EPR, or Extended Producers' Responsibility.

Only a business that is able to harmonize the developmental life-cycle of a commodity all the way from its design to its recycling – through production, marketing, use, waste collection, transportation and re-use – will be able to minimize the environmental load synthetically. The second issue will be to decide how the costs are to be borne. Even if at first the manufacturer must carry a tentative burden, the ultimate cost, whether it is added to the regular price or shifted to the consumers, will depend upon the market and the conditions of competition. Problems which will have to be solved independently concern new investment, the barriers

erected to prevent new competitors, the danger of monopolies, all of which will be accompanied by the producer's extended responsibility for bearing the charge of the enterprise.

In Japan, the producer's extended responsibility, seemingly very strict, has been characterised by terms like "zero-emission" to represent zero-waste (the auto-makers' attempt to recycle material under the guidance of MITI), and by the urgent enactment of the "Law for Recycling Home Electric Appliances".

All these measures are indispensable if the socio-economic system is ever to conserve the environment.

4. Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging

(1) Point at Issue

Since nearly half the volume of domestic waste in Japan consists of containers and packaging, cans, bottles, PET bottles and paper packages, a law was passed in April 1997 to promote the "Sorted Collection and Recycling of Containers and Packaging". It was immediately contested, however: the Tokyo Metropolitan government and 12 other cities called for the law's reconsideration because of the excessive burden that its provisions would place on local government finances.

As a result of the modern practice of mass production, mass distribution, mass consumption (and thus mass waste), the need to attract customers has led manufacturers to use many kinds of packaging that are designed to appeal to the buyer, which in turn has led to the shocking waste of the materials used to make containers and packings. And as the number of nuclear families has increased, so the volume of small goods to provide for these families has also increased: this has greatly added to the mass waste of containers and packaging.

The point at issue is whether we can seize this opportunity to change the waste disposal system by encouraging recycling and so reducing waste, by involving the enterprise which in the first instance left the waste untreated.

(2) A Comparison of the Japanese, German and French systems

The "Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging" stipulates a number of conditions: first, a city, town or village must establish classificatory criteria for the sorting and sacking of different kinds of waste matter according to their constitution (for instance, whether biodegradable or non-biodegradable), must specify the types of sacks to be used by the consumer, and must collect the waste thus sorted at set times; second, the domestic (and other) consumer must cooperate by sorting and sacking separately the various kinds of waste; finally, the manufacturers and users of containers must ensure that the recycling businesses remarket the material as recycled goods.

Japan enacted this Law only after the German and French governments had earlier inaugurated their own systems for the sorted collection of containers and packaging. The new law, sponsored by the Ministry of Health and Welfare, received important support from the All-Japan Prefectural and Municipal Workers Union, a local government labour union, which agreed to cooperate with the policy as a means of maintaining and expanding a directly managed union workers shop.

The German system, DSD (Dual System Deutschland) provides that the collection and classification of waste should not be carried out by the local authority but by a separate organisation which is responsible for recycling goods marked with a "green dot", and that the manufacturing enterprises and sellers of goods marked with a "green dot" should pay the DSD the costs of collection. The French system on the other hand requires the local government to take the responsibility for the collection while the responsibility for the recycling is in the hands of the Eco-Emballage Company, whose operations are financed by the container manufacturers and users who must also guarantee the lowest price and take back recycled goods. Although the Japanese government adopted a system closer to the French one, taking into consideration the present situation in which the local government and the inhabitants have a joint responsibility for the recovery of resources, the local government must also establish the criteria for the sorting and permitted volumes of collected waste, and has no assurance that the manufacturers will guarantee the lowest price for the goods to be recycled.

(3) The Heavy Burden on Local Government

The most serious burden imposed on local governments by the new system is the exceedingly heavy cost of collection. For instance, while local governments must use public tax to pay ¥25 to ¥30 per PET bottle, the manufacturers during the fiscal year of 1997 were only expected to pay ¥10,000 per ton, the equivalent of no more than ¥1 per 10gs. The disproportion shows how heavy is the relative burden borne by the local government.

While local governments have been earnestly engaged in carrying out the collection of sorted goods, they are also expected to bear an additional heavy financial burden, something in the region of ¥100,000 per ton of PET bottles, since two types of industry are exempt from the duties: a manufacturing industry with fewer than 20 employees and an annual income of under ¥240,000,000, and a commercial service industry with fewer than 5 employees and an annual income of under ¥70,000,00. At the same time, the local government faces supplementary expenses incurred by the sorted refuse criteria: cleaning, condensing, the prevention of re-mixing, and so on – equal to the expenses of maintaining a ten-ton truck.

For these reasons, Tokyo and the other 12 unhappy cities requested that the new law should be reconsidered. Tokyo, indeed, has enacted its own "Tokyo Ordi-

nance", which asks the enterprises concerned to make their own voluntary collections.

The "Tokyo Ordinance" has three steps. The first seeks to promote the enterprise's voluntary collection. The second, which incorporates the first, requests the distributor to install a collection box and asks all enterprises to collect the container material as a recovery resource. The third requests the installation of a collection box to be used by the collector and distributor of the sorted material, requests the container and content makers to carry out intermediate treatment and recycling, and requests the local government to take temporary responsibility for the delivery of other material to the intermediate disposal facility. The 12 other cities who supported the protest asked for the same voluntary collection on the part of the recycling enterprises. In October, 1997, the Tokyo municipal government and the makers of PET bottles reached an agreement that the PET makers should take the responsibility for establishing a recycling facility and that the Tokyo municipal government should rent out property to PET for storing the collected goods before onward transportation.

(4) Weak Incentive to Waste Reduction

The German DSD system requires the enterprise to pay the cost of container and packaging disposal. In the case of plastics, for instance, this cost is about 20 times higher than the rate for the disposal of glass: this is intended to discourage the manufacture of those kinds of container and packaging which are difficult to dispose. In Japan, on the other hand, thanks to the great increase in the sale of mineral water, sales of plastic bottles have rapidly increased (by more than three times between 1996 and 1997): indeed, in expectation of the "Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging", the makers of PET bottles actually lifted the voluntary self-control on the manufacture and use of such bottles. It is a great weakness of the Japanese system that nothing is done to prevent or discourage this kind of thing from happening.

The "Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging" stipulates that returnable glass bottles are to be collected by the enterprise, but in fact the bottles are not re-used immediately: in Sapporo, they are smashed into cullet (gobbets of glass which can then be re-moulded). This is part of a scheme instituted by the Sapporo Municipal government which asks residents to sort cans, glass bottles and PET bottles separately from "inflammable garbage." Residents pack the sorted waste into specified transparent bags, which are collected by the routine garbage trucks once or twice a week. At the same time, the majority of the rapidly-increasing number of PET bottles on the market become pure waste since only about 30%, at the highest estimate, are collected: the absolute volume of PET bottles that are neither recycled nor re-used has therefore also in-

creased, just as rapidly.

(5) The Problem of a Mismatch

Currently, excessive stocks of used paper are burnt because of a shortage of storage space (stockyards). A similar imbalance between supply and demand is likely to occur in the recycling of containers and packaging. The new act provides that competent ministers of the Finance Ministry, MITI, the Ministries of Health and Welfare, Agriculture, Forestry and Fisheries should decide on the recycling programme, while city, town and village authorities must establish plans for sorted collection. Plans for 1997 through to 2001 have already been drawn up, and it appears that no more than 15% of cities, towns and villages throughout Japan are proposing to collect PET bottles. Even under the recovery programme operating in 1997, no more than 44% of the PET bottles that had been sold had been recovered.

With regard to plastics (polystyrene foam, vinyl chloride, wrapping foil and such like) – which from the fiscal year 2000 are to be collected separately – no likely technology for their recycling is in prospect. Even Germany faces the problems of coordinating supply and demand, the development of technology (R&D) and the product market-development of recycling, and this will constitute a major task for the future. It is particularly urgent to prepare stockyards (to allocate storage space, that is) to house sorted and collected container and packing waste.

(6) Further Problems and Prospects

It is difficult to argue that the Japanese “Container and Packaging Recycling Act” will offer an opportunity to reform the system for the mass disposal of waste. Indeed, all it entails is “mass recycling at public expense”.

So, what shall we need to do in order to promote the use of returnable bottles and put a stop to the wasteful habit of using most containers no more than once? If we could actually do something about this, it would be the key to overcoming the problems of mass waste. Europe has already devised a combined method of “command and control” and has created the economic instrument to implement it effectively. The Environmental Agency investigated this method in its report “Committee on the Promotion of the Re-use of Containers and Packaging” (in August, 1996, the Chairman of the Committee was Professor Kazuhiro Ueta of Kyoto University). The committee made the following recommendations:

- 1 that, as in Germany and Denmark, manufacturers should be obliged to use returnable containers and should be forbidden to market containers that were non-returnable;
- 2 that, as in Finland, the use and sale of any containers that are non-returnable should be taxed;
- 3 that, as in Germany, the quality of returnable containers should be standardised;

- 4 that, as in the Netherlands and Germany, the introduction of a system for the return of PET bottles should be promoted ;
- 5 that a system for the deposit and refund of returnable containers should be introduced.

It is already clear from the European experience that these arrangements have practical as well as theoretical effects. What then needs to be considered are the measures which will be required to support them : the construction of stockyards for reusable goods, better rinsing facilities, and the promotion of the issue's priority at the level of public institutions.

An investigation by the German Federal Ministry of the Environment has demonstrated that a smaller environmental load is imposed by the use of returnable bottles : it found that a returnable bottle consumes less raw material than a non-returnable bottle, that it emits fewer pollutants, and that waste is reduced if the recycling process is kept within a radius of 100km and if the product is reused 25 times.

The current "Container and Packaging Recycling Act" is likely to cause problems, however, because mass recycling will be carried out at public expense. To overcome this weakness, it will be necessary to link the economic measures taken with various methods of direct control. European countries have established such a system and excellent results have already been obtained.

5. Economic Analysis of A Garbage Charging System

(1) Point at Issue

The notion of a "garbage charging system" has been attracting public attention as a means of reversing the accelerating increase in quantities of household refuse and municipal waste. An investigation carried out by the Ministry of Health and Welfare in June, 1993, into the garbage collection arrangements of 3,236 municipalities found that 1,317 local governments had established systems for the controlled collection of waste, which seemed to correspond with the figure (40%) of those local governments which had introduced a "payment per unit weight system".

Three types of system have been considered. The first fixes the cost by quantity, which is the strict "payment per unit weight system" ; the second charges only for large quantities, which means that up to a certain weight collection and disposal is free of charge ; the third levies a fixed charge, regardless of the amount of garbage to be disposed of. When the charge is fixed according to quantity, four other conditions may be imposed : (1), residents must buy a properly designated garbage bag ; (2), residents must buy an appropriate sticker label or seal and attach it to the proper garbage sack ; (3), the charge may depend on the size of the litter bucket ; or, (4), each household must pay a lump sum per person per month.

If carried out effectively, these measures would have the following six effects :

(1), the reduction of waste ; (2), the promotion of recycling ; (3), the spreading of the cost burden impartially according to quantity ; (4), the avoidance of mixing different types of waste ; (5), the raising of financial resources ; (6), the awakening of the public consciousness. The measures, though, may also create problems : (1), residents may find themselves having to pay a double levy ; (2), they may appear to residents to be a form of retrogressive taxation ; (3), they may act as an incentive to illegal dumping ; and, (4), they may not always act in harmony with, or may come into conflict with, the overall reform of mass consumption and mass waste. It might therefore, (5), be better if the system were first tried out as a charging system for ordinary business waste.

(2) Household Garbage Disposal Service

Opinions differ about the kind of service that the household garbage disposal system should offer. Should it be a public service, or should it operate as a private enterprise in the open market ? Or should it combine elements of both public and market-operated services ? A survey of the present household garbage disposal service and of public opinion should be carried out, bearing in mind all the points mentioned in⁴ above.

I should like to think of this issue as a specific problem arising out of a historic change in the nature of household garbage and the effect that this has had upon the local government's garbage disposal service. In the days when household garbage consisted mostly of food waste, the local government disposed of it as a matter of public health, in an effort to prevent disease and to discourage illegal dumping. These days, however, household garbage consists of many different kinds of waste, quite apart from food waste. The new "Waste Disposal and Public Cleansing Law" (within the jurisdiction of the Ministry of Health and Welfare) has been enacted to cover the unprecedented situation which society now faces.⁵

With a change in the Japanese people's lifestyle and an increase in mass consumption, there has been an increase in the production and consequent wastage of

4 H. Yamakawa and K. Ueta (1996), "Concerning the Garbage Charging System : The Attainable Level and Agenda," *Environment Science Association Journal*, Vol. 9, No. 2.

Ms. Y. Ochiai suggests six ways by which the expenses of garbage disposal may be borne, if the disposal is charged for in accordance with a per unit weight system.

- ① In proportion to the Emission overall
- ② In proportion to the Emission Volume at each stage of the emission process
- ③ Emission to be free of charge up to a certain Volume
- ④ A combination of costings with (governmental) Support
- ⑤ A combination of costings with other kinds of Support (the Refraction Type)
- ⑥ A combination of costings according to a Fixed Sum System, the costs Charged by Quantity

See to N. Maruo, N. Nishigatani, and Y. Ochiai (1997), *Ecocycle Society*, Yuhikaku, Chapter 3.

5 T. Gunjima (1995), "Thinking about User-Charge System and Its Effects," *Waste Management Research*, Vol. 6, No. 2, p. 163.

paper, containers and packaging. A survey carried out by the Sapporo municipal government, for instance, concluded that the main reason for an increase in flammable garbage has been the increase in waste paper and plastics. Consequently, what worked a generation ago no longer works now, and changes in the practice of garbage disposal have to be made to correspond with the realities of present day living. Since the new types of garbage can all be recycled, and may be reused in alternative ways (other than by disposal through traditional methods of incineration and landfilling), the disposal business can now be considered a marketable service, its charges corresponding to the income level of respective households. Consequently, we can say that the nature of the present household garbage disposal service reflects the characteristics of both public and marketable services.⁶

It has been argued that the free public service of garbage disposal has brought about an increase in the amount of garbage to be disposed of. Since disposal costs can, at present, be left to local governments to finance, there has been no need for enterprises to restrain the ever-expanding manufacture and use of non-returnable containers.⁷

Although the water supply and sewage disposal are matters of public health and have been deemed to be issues of public service, certain public charges, corresponding to the amount of water consumed or water wasted, have, in certain places, been levied, and we shall need to find a strong reason in principle to argue that the household garbage disposal system should be run as a government enterprise, free of charge. In certain foreign countries, notably the USA, not only is the water supply managed as a marketable service, so, too, is waste disposal. Services, whether public or private, and the cost of running them, depend upon the history and character of each individual local government.

(3) The Income and Substitution Effects of Charging the Public for the Disposal of Household Waste

The imposition of a charge for the collection of household waste would be the equivalent of raising the price of household goods. We can thus consider the consequences of introducing a charge system in terms of the income effect and the sub-

6 Y. Kitabatake and O. Nakasugi (1982), "Actual Conditions of Collecting Fees of General Waste Disposal and Analysis of Its Effects," *Regional Study*, Vol. 12, p. 57.

They suggest that "If at the time of decision-making, the local government considers the external effect of the amount of service supplied, then, as the ratio of private burden of the total costs decreases, so the amount of service supplied increases."

7 K. Ueta, (March 1996), "Economic Analysis of Charging System of Garbage," *Economics Seminar*, p. 218.

It was included in *Economics of Environmental Policy*, ed. by K. Ueta and others, Nihon Hyoron Publisher, 1997.

stitution effect.⁸ The income effect would be a reduction in the generation of solid waste as a result of a reduction in spending on goods. On those within the high income bracket, a waste disposal charge would have little effect and there would be no reduction in the amount of garbage they threw out. People within a fixed income bracket, on the other hand, people like pensioners, or those with only a low income, would find the charge eating into their savings and they would try to reduce the amount of garbage that they had to dispose of. This situation has been called "the retrogressiveness of the waste charge," and any waste charge aimed at having an income effect would do little to reduce waste: it would, indeed, lead to the problem of retrogressiveness. The substitution effect, on the other hand, aims to reduce waste by finding ways other than waste collection as means for its disposal. These substitutive ways include using food waste as compost, on-site incineration, reuse, recycling, illegal dumping and so on. Both on-site incineration and illegal dumping, however, would only add to the burdens already imposed upon the environment.

A case study has in fact been made of the income and substitution effects caused by the introduction of a waste charge, and we should now carefully consider the results of this study.

(4) The Waste Reduction Effect of a Garbage Charge System

For several years, a group led by Prof. Nobutoshi Tanaka of the Faculty of Engineering, Hokkaido University, has been conducting a nation-wide survey of the problems which result from the imposition of a household waste disposal charge.⁹

Their survey reveals that about 40% of all local governments have adopted a garbage charge aimed at reducing the costs of disposal, while other local governments have adopted a designated bag system, which aims to reduce waste by having it sorted completely before it is collected. Data provided by 18 local governments makes it clear that, in spite of great differences between the amounts of waste collected in different local government areas, there had been a tendency for a gradual increase in the amount of garbage before the imposition of the charge, and a tendency for the amount of garbage to decrease after the charge had been levied. After

8 T. Gunjima (1995), "Thinking about User-Charge System and Its Effect," *Waste Management Research*, Vol. 6, No. 2, p. 164.

Economics of Environmental Policy, ed. by K. Ueta and others, Nihon Hyoron Publisher, 1997, pp. 219-222.

9 N. Tanaka, "Solution and Management Plan Theory of the Generation and Circulation Structure of Solid Waste in the Urban Area," Research Reports of 1990, 1991, and 1992 Science Research Subsidy, Ed. by N. Tanaka and others, "Research of the Effects of Waste Charging System on the General Domestic Resource Consumption Reduction Life-style," The Research Report of 1995 Science Research Subsidy, Ed. by N. Tanaka and others, "Research of the Effects of Waste Charging System on the General Domestic Resource Consumption Reduction Life-style," The Research Report of 1995 Science Research Subsidy.

the enforcement of the waste charge system, there was a rapid decrease in the volume of waste produced, but after about three years the volume levelled out, or even began to increase again.

(1) In Moriama City, Shiga Prefecture, Date City, Hokkaido Prefecture, and Oshamambe Town, Hokkaido Prefecture, the amount of garbage dropped by 30 to 50%, and thereafter the percentages remained constant.

(2) In Ina City, Nagano Prefecture, and Matsu-ura City, Nagasaki Prefecture, the rate in the reduction of waste has remained more or less constant at around 5%.

(3) In Hitachi Ohta City, Tochigi Prefecture, Yuzawa City, Niigata Prefecture, Chino City, Nagano Prefecture, Takayama City, Gifu Prefecture, and Izumo City, Shimane Prefecture, the rates of reduction have been as much as 20%, but since the charges were only levied one or two years ago, the Survey must continue to watch these rates for the time being.

(4) In Shiroishi City, Miyagi Prefecture, Dazaifu City, Fukuoka Prefecture, Tsukushino City, Fukuoka Prefecture, there has been a 5% to 10% drop in the garbage rates, but, again, we must keep an eye on these rates since data only exists for the one or two years since the charges were levied.

(5) In some cities, however, where the rates of reduction fell initially by as much as 20%, the volume of garbage has gradually increased again, and has now reached the levels recorded before the charge was enforced: places of this type include Taku City, Saga Prefecture, Mobara City, Chiba Prefecture, Naruto City, Yamaguchi Prefecture, and Masuda City, Shimane Prefecture.

The Survey finds that a waste charge system makes it possible to reduce household waste by at least 10%, equal to about 100g per person per day. It is significant, however, that in some localities rates returned to normal after a small drop in the volume of garbage, which indicates that the charged bag system has no obvious effects on the quantities of unflammable garbage. Remarkable reductions in household waste were observed, though, when ordinary business waste was separated from collected household waste. The estimated average reduction of household waste amounted to 87g per person per day, which worked out at an average 15% in the rate of reduction. The contribution made by efforts at self-disposal came to 50%, the contribution made by a reduction in "obsolete scrap" was 40%, while the recovery of resources contributed 10%. The average rate of "refusing to buy what is likely to be wasted" stood at 21%, which indicates that "the charging system" has no influence on the citizen's refusal to buy unnecessary goods.

In view of these particular substitution effects, it appears that the charging system leads to a reduction in waste as a result of an increase in garden compost and primary incineration. The self-disposal of kitchen waste as compost is clearly appropriate, but backyard burning is likely to emit a dangerous quantity of chlori-

nated chemicals.¹⁰

The Survey confirms that in the local government areas where the charged bag system has been adopted the inhabitants have made their own evaluations of the system, and have modified their behaviour accordingly. Especially if they believe that the financial burden has been lightened, residents feel "a sense of achievement that they have succeeded in reducing waste", while the introduction of the system "has raised the residents' concern about the problems of garbage and its harmful effect upon the environment." At the same time, "the charging system appears to have caused few cases of illegal dumping." As most families were already participating in programs of resource recovery at the time of the levying of the waste charges, resource recovery has contributed little to new figures of waste reduction.

In a large city where the waste charge has not yet been imposed, an opinion poll revealed that half the inhabitants believe that the quantity of waste reduced will depend on how the charge is levied. Most of them are of the opinion that the charge should depend on the volume of solid waste to be disposed of, and that charges should not be levied for an average volume of waste but only on waste which *exceeds* the average. An average volume of waste should be collected free of charge and a charge should be levied on whatever exceeds that average volume. This would have a bearing upon the income effect of the waste charge. It also indicates that the people wish to clarify waste disposal expenses, believing that a certain minimum of waste should be collected and disposed of at public expense, and that only excessive waste should have to be paid for by the individuals responsible for that waste. This would eliminate the problem of retrogressiveness.

(5) Conclusion

We have now seen that the most we can expect a waste charge to achieve would be a reduction of waste in the region of 10%. Anything more than this would be exceptional. As Dr. Tanaka emphasises, however, the waste charge is important as a means of raising people's consciousness of the environment and increasing their awareness of the dangers that it faces. It is therefore important that the public should be informed about the environment and notified of the hazards to which it is subjected. At the same time, reasons for the charges levied on the collection of waste must be carefully explained, while details of accounting must be made publically available.¹¹

10 T. Kamishita and others, (1996), "Environment Load of On-site Burning in the Local Government Garbage Which Has Introduced the Charging System," reported in the Seventh Waste Society, pp. 81-83.

11 M. Ohno and others (1995), "Survey of Opinions about the Introduction of Charging System of Domestic Waste," *Urban Cleansing*, Vol. 48, No. 209, pp. 41-42.

The report makes three points ; ① that we need to clarify the purpose of the charging system, or

When we consider the income effect of the waste charge, we must also consider the related question of retrogressiveness. Izumo City and Takayama City appear to have solved the problem by using a "penalty system" and charging only for large quantities of waste: a certain number of bags and seals are distributed free of charge and residents have only to pay a collection charge for any waste over and above the standard volume. This scheme has the support of most of the population.

At present, the aim of the substitution effect is to prevent waste emission by encouraging self-disposal and recycling. Self-disposal entails, in the main, turning food waste into compost and burning one's own domestic refuse. Some local governments subsidize these endeavours. In big cities, however, where few people have gardens, making compost is a problem, while on-site burning is likely to be a source of air pollution. Although systems for the recycling of recovered resources have already been established, they are quite separate from systems that charge for waste collection, and they differ widely from city to city. And here we can say that the greater the number of systems used for recovering resources and sorting materials which a city adopts, the greater the rate in the reduction of waste that such a city is likely to achieve.

When Dr. Yasoi Yasuda carried out an investigation in Noda City, Chiba Prefecture, he found that resources were sorted into fourteen different categories and that as a consequence the amount of unflammable domestic waste fell by 38%, while Moriyama City, Shiga Prefecture, which has, for a long time, directly managed a resource recovery program, has achieved a reduction rate of 59%. These figures confirm the proposition, suggested earlier, that waste reduction can be best achieved not by a waste charge but by a complete and thorough program of rigorous sorting and separate collections. In order that the public should fully participate in the sorting and collecting of resources, it is essential that the local authority, the residents, and the disposal enterprises should work together as one united body, in which everyone is properly and fully informed about the environment and the local infrastructure (such as the location of stockyards), through the distribution to every household of suitable explanatory publications.

whether it should be regarded in terms of the reduction of the public financial burden, or whether it should concentrate on a reduction in the volume of waste produced ② that we must not expect too much reduction in the volume of waste from the charging system itself; and, ③ that it is in fact difficult to say whether a waste charging system would actually be an efficient social method for reducing the quantity of waste.

M. Taguchi, *Encyclopedia of Garbage Problem II*, Shin-Nippon Publisher, 1998, pp. 170-173.

Table 1. Comparison of PCDDs/DFs in Air between Japan, Europe, and United States

Japan (Air Pollution Control Division 1996)			
Area		Average Concentration	(pg-TEQ / m ³)
Residential Area near industrial district	1990	0.10-2.3	0.57
	1992	0.01-2.0	0.62
	1994	0.01-2.6	0.63
Metropolitan areas	1990	0.00-4.7	0.66
	1992	0.00-2.6	0.60
	1994	0.00-3.0	0.37
Middle sized and small cities	1990	0.00-4.1	0.71
	1992	0.00-1.9	0.36
	1994	0.00-1.1	0.20
Background areas	1990	0.00-1.2	0.19
	1992	0.00-0.03	0.01
	1994	0.00-0.11	0.02
Europe and United States			
Area	Country and area	Years of Measurement	Concentration (pg-TEQ / m ³)
Rural area	US, Minnesota, rural (Maisel & Hunt 1990)	-1990	0.021(n=21)
	Germany, Kiberg, rural (Liebel et al. 1993)	1990-1992	0.04
	Germany, rural (Fiedler 1994)	-1993	0.025-0.070
	Sweden, country (Broman et al. 1991)	1989	0.004
	The Netherlands, background (Bolt & de Jong 1993)	1991	0.01-0.015
Urban area	US, Connecticut, urban (Maisel & Hunt 1990)	-1990	0.092(n=27)
	US, California, urban (Maisel & Hunt 1990)	-1990	0.091(n=34)
	Germany, industrial area (Liebel et al. 1993)	1990-1992	0.15
	Germany, urban (Fiedler 1994)	-1993	0.070-1.350
	Sweden, suburb (Broman et al. 1991)	1989	0.013
	Sweden, city (Broman et al. 1991)	1989	0.024
	UK, city (Clayton et al. 1993)	1991	0.04-0.10
Near sources	Germany, close to source (Fiedler 1994)	-1993	0.35-1.60
	The Netherlands, MSWI (Bolt & de Jong 1993)	1991	0.01-0.15

Source) S. Sakai, "Environmental Policy and Status for Chlorinated Dioxins and Related Compounds," *Environmental Economics and Policy Studies*, Vol. 1, No. 2, 1998, p. 166.

6. Pollution by Chlorinated Dioxins and Related Compounds

Japan is now more polluted by dioxins and related compounds than any other country in the world. The rate of dioxin generated by the waste incineration facilities of each local government authority is now as much as 5kg per year, and an investigation is currently being conducted into the actual conditions of the most obvious sources of this generation: those incineration facilities which dispose of chlorinated organic compounds, waste oil, medical waste from hospitals, as well as iron manufacturing plants. In the neighbourhood of these facilities, the concentrations of dioxin in the air have been recorded as 0.6pgTEQ/m³ in big metropolitan and residential areas, when compared with background areas without artificial pollution: the average figure amounts to 0.05 to 0.06pgTEQ/m³. (See Table 1) TEQ is the acronym for "toxicity equivalents", and it indicates the sum of the toxic values after the toxicity of each dioxin homologue has been converted to 2,3,7,8-TCDD - which is the most toxic of all dioxins.

Polychlorinated dibenzo-*p*-dioxins, known simply as PCDDs, are in general often dealt with as kinds of dioxin; to them we may add polychlorinated dibenzofurans, or PCDFs. The toxic mechanism of Coplanar PCBs is similar to that of dioxins. Dioxin has been notorious ever since the Americans used it as a defoliant during the Vietnam War; in Japan, it is well-known that PCDFs and Coplanar PCBs are responsible for the Kanemi Oil Disease.

It is said that 70% of all the world's garbage incinerators are located in Japan and that the incinerators which burn municipal solid waste (MSW) are the principal originators of dioxin. Although no complete investigation has yet been made of the incinerators and small-sized furnaces which burn industrial waste, there can be no doubt that the pollution for which they are responsible is likely to be intensely hazardous. Nor can there be any doubt that the present high level of dioxin pollution of Japan's environment is an inevitable result of the Japanese principle of waste incineration.

Although Prof. Ryo Tatsukawa of Ehime University detected dioxin in a sample of flyash taken nation-wide from nine incinerators as long ago as 1983, it was not until 1997 that the Ministry of Health and Welfare finally decided to make public the actual situation of dioxin emissions from Japanese waste incineration facilities. Acting on Prof. Tatsukawa's findings, the Ministry did set up a special investigating committee, and although in 1990 it established guidelines to control PCDDs/DFs, these had no legal status. Consequently, both pollution of the air by dioxin emitted from incinerators and the dumping of flyash in controlled landfill sites were left to take their own course.

When we reflect that Japan incinerates more waste matter than any other country in the world, we really should have paid much more attention. Yet in spite of our being the country with the world's highest levels of air-borne dioxin, the mea-

asures Japan has taken to control pollution caused by emissions from waste incinerators lag far behind those of other countries. In June, 1996, the Ministry of Health and Welfare did finally set a limit to the daily intake of dioxin that would be considered harmless to human health: 10pgTEQ/Kg/day. At the same time, the Ministry's revised "Air Pollution Control Law Enforcement Ordinance" and the "Waste Disposal Law Enforcement Ordinance" set out to regulate standards for the emission of dioxin from incinerators: in the case of a newly built incinerator, less than 0.1 to 5ngTEQ/Nm³ (1ng is equal to one-one billionth gram of ppb), and in the case of an old incinerator, 1 to 10ng-these levels to be achieved over a period of five years, or 80ng to be achieved over the period of a year.

Dioxin can affect the human body in a variety of ways, from acute toxicity to chronic toxicity, carcinogenity, and changes to the thyroid gland. It has recently been noticed that it can also induce reproductive toxicity. In the past, dioxin has usually entered the human body through meals of fish, particularly shellfish, so that it is especially alarming to learn that a baby can be infected with dioxin through its mother's milk. In fact, 51pg fat concentration of dioxin was found the milk of an Osaka mother, the highest concentration yet noted in a Japanese subject. It has also been suggested that there may be a link between dioxin in a mother's milk and cases of atopic dermatitis: the rate of atopic dermatitis is higher amongst babies fed by mother's milk than among those fed with artificial milk.

A further consequence of dioxin in the environment may be the high death rate of babies in the Saitama District, which is the home of many industrial waste incinerators, and where the local government has subsidized small-scale incinerators for longer periods than is common in other areas. (Asahi TV's "News Station", March 31, 1998) At the same time, the inhabitants of Ryugasaki City and Shintone Town, both of Ibaragi Prefecture, appealed to the court for the shutdown of incinerator operations after it had been revealed that a high rate of deaths from cancer could be related to high levels of dioxin in the atmosphere. Such evidence calls for prompt action and a quick solution: a special committee must make a thorough investigation in areas close to waste incinerators in order to trace the connection between states and levels of environmental pollution and injuries to human health.

The most fundamental measure necessary to reduce dioxin pollution must be a reduction in the amount of waste incinerated. During incineration, it will be necessary to control completely, by means of the 3Ts (temperature, time and turbulence), any production of dioxin. Although the mechanism by which dioxin is produced is in general understood, certain problems still await solution: more needs to be known about the parts played by vinyl chloride, waste home electric appliances, waste wood, chlorinated fire retardants and antiseptics, products which include copper (which undergoes the catalysis of dioxin in a re-composite reaction), and salty waste

foods.¹²

If plastic waste were to be strictly sorted and perfectly collected, if all food waste were to be reduced to compost, and if cast-out home electrical appliances were to be strictly recycled according to the provisions of the "Sorted Collection and Recycling of Containers and Packing Law", then there would be a huge reduction in the amount of waste that needs to be incinerated. In fact, Sweden and Germany have placed a temporary moratorium on the building of new incinerators, and for newly constructed incinerators have set the strict standard of 0.1ng emissions of dioxin: these steps, as well as reducing dioxin, have also succeeded in reducing waste.

The measures which the Japanese Ministry of Health and Welfare have taken to control dioxin emission have actually had the effect of enlarging the market for the makers of waste incinerators, which now centers upon the high-technology control of the dumping of waste. In consequence, a huge financial burden has been placed on the shoulders of the local governments, a burden which these days includes the expenses for the disposal of flyash. Most local governments are beginning to demand that measures should be taken against the emission of dioxin from small-scale incinerators, although in such an area as Hokkaido, where the population is widely dispersed and there is a limit to how much waste can be collected, small-scale local incineration is likely to remain a problem that may be difficult to resolve.

The incineration of waste is responsible not only for the emission of dioxin but also for the release of toxic gas and carbon dioxide, which runs counter to the aim of reusing resources in the most effective way. If we hope to reduce waste, it will be necessary to put a stop to the old traditional ways of incinerating waste; and we must incinerate what waste remains while ensuring that the emission of PCCDs/DFs is thoroughly controlled. In recognition of the need for social and technical measures to counter the threat of dioxin, the Tokyo metropolitan government is about to reconsider its policy "to build an incinerator in every ward", and will give preference instead to the building of recycling facilities.

7. The Transboundary Movement of Hazardous Waste

A further problematic issue in the world of waste is the transfer (as export) of leftover aluminium ash from Japan to North Korea and the Philippines. In recent years, the practice of transferring waste on an international scale has greatly increased, some of it from one corner of the world to another, yet definitions of this transboundary movement of hazardous waste vary from country to country. The OECD has published export and import statistics for the movement of hazardous

12 H. Miyata (1998), *Well understanding Dioxin Pollution*, Godo Publication, P. 149.

Miyata says from various experiments have made it clear that the contribution of salt to the generation of dioxin in the emission gas is so small as to be in fact negligible.

Table 2. Transfrontier Movements of Hazardous Wastes
by OECD Countries (1989-93)

(Unit : ton)

(a) Export

Fiscal Year	1989	1990	1991	1992	1993
Austria	86,773	68,162	82,129	70,023	83,998
Belgium	176,983	491,784	645,636	37,278	34,073
Canada	101,083	137,818	223,079	174,682	229,648
France	n. d.	10,552	21,126	32,309	78,935
Germany	990,933	522,063	396,607	548,355	433,744
Netherlands	188,250	195,377	189,707	172,906	163,180
UK	0	496	857	0	0
USA	118,927	118,416	108,466	145,556	142,709

(b) Import

Fiscal Year	1989	1990	1991	1992	1993
Austria	50,981	19,180	111,595	79,107	28,330
Belgium	1,036,260	1,070,496	1,021,798	208,052	236,010
Canada	150,000	143,811	135,161	123,998	173,416
France	n. d.	458,128	636,647	512,150	324,538
Germany	45,312	62,636	141,660	76,375	78,219
Netherlands	88,400	199,015	107,251	250,355	236,673
UK	40,740	34,983	54,074	44,673	66,294
USA	n. d.	n. d.	n. d.	n. d.	n. d.

Source) OECD, *Transfrontier Movements of Hazardous Wastes, 1992-93 Statistics*, 1997.

waste amongst its member nations (Table 2), and its figures for the five years from 1989 to 1993 show that Germany exported 2.9 million tons of waste, Belgium 1.39 million tons, the Netherlands 0.91 million tons. Belgium was also the largest receiver of waste, importing 3.66 million tons.

Meanwhile, Greenpeace has collected official and unofficial data for the years 1989 to the spring of 1994 on the transfer of hazardous waste from member countries of OECD to non-member countries.¹³ Germany exported waste on 214 occasions, the US on 208 occasions, and the UK on 101 occasions. In Eastern Europe, Russia imported waste on 300 occasions, the Asian Pacific on 250 occasions and Latin America on 150 occasions. The US headed the list of those who exported hazardous waste to the Asian Pacific area,¹⁴ at more than 5 million tons, Canada came

13 Greenpeace, (1994), *Database of Known Hazardous Waste Exports from OECD to non-OECD Countries*.

14 Greenpeace (1994), *The Waste Invasion of Asia*.

Table 3. Export and Import of Designated Hazardous Waste in Japan
(Basel Treaty Regulation)

(a) Export

Fiscal Year	1995	1996	1997
Notice to Opponent Country	1,791 tons /8 Cases	8,948 tons /6 Cases	4,120 tons /4 Cases
Export License	474 tons /3 Cases	3,730 tons /5 Cases	6,398 tons /4 Cases
Issue of Export Transfrontier Papers	2,814 tons /26 Cases	1,721 tons /52 Cases	5,787 tons /49 Cases

(b) Import

Fiscal Year	1995	1996	1997
Notice from Opponent Country	4,179 tons /21 Cases	10,660 tons /14 Cases	12,466 tons /17 Cases
Import License	2,889 tons /19 Cases	10,033 tons /13 Cases	9,559 tons /15 Cases
Issue of Import Transfrontier Papers	1,163 tons /47 Cases	8,722 tons /53 Cases	7,973 tons /55 Cases

Notes)

- 1) Importing countries are France, Germany, U.K., U.S.A., Korea, and Malaysia, all of which have the purpose of collecting metals of copper, tin, and so on.
- 2) Importing countries are Belgium, Germany, USA, Indonesia, and Korea, all of which have the purpose of collecting and recycling metals of copper, tin, and so on.
- 3) Importing countries are Germany, Belgium, U.S.A., Korea, and Indonesia, all of which have the purpose of collecting and recycling metals of copper, lead, tin, cobalt, tungsten, nickel, cadmium, and so on.
- 4) Exporting countries are Austria, Netherlands, U.S.A., Philippines, Hong Kong, Korea, and Malaysia, all of which have the purpose of collecting and recycling metals of copper, silver, and so on. But one of the cases has to be land-fill disposal of plating wastewater treatment sludge including lead.
- 5) Exporting countries are Austria, Australia, Canada, Netherlands, U.S.A., Philippines, Hong Kong, and Malaysia, all of which have the purpose of collecting and recycling metals of lead, tin, and so on.
- 6) Exporting countries are Austria, Australia, Canada, Netherlands, U.S.A., Korea, China, Hong Kong, Singapore, Philippines and Malaysia, all of which have the purpose of collecting and recycling copper, lead, arsenic, selenium, tellurium.

Source) Marine Environment and Waste Countermeasure Section of the Environment Agency.

second, and the UK third.

South Korea imported far and away the largest quantity of hazardous waste, followed (though a long way behind) by India. An overwhelmingly large proportion of the hazardous waste as a whole consisted of lead, copper and tin; other types of hazardous waste included sludge, used plastics, used lead batteries, used computers, disused leather and similar goods.

In 1989, the Basel Convention adopted a proposal to prohibit the transboundary movement of hazardous waste, and this came into formal effect in 1992. Japan subsequently passed a domestic law modelled on the Basel Convention, but it does not

cover all cases specified by the Convention. (Table 3) The Japanese Environment Agency has published statistics for the country's export and import of hazardous waste for the fiscal years 1994, '95, and '96. In 1997, documents were issued to authorise the transfer of hazardous waste: for export 5,787 tons (49 instances) and for import 7,973 tons (55 instances). The export partners were Belgium, Germany, the USA, Indonesia, South Korea, and they all aimed to recover certain kinds of metal, particularly copper and tin. But statistics do not always reflect the actual conditions. For example, The Ministry of Finance's "Monthly Report on Japanese Trade" refers to "waste lead, code number 7,802", which seems to consist mostly of lead batteries, and is not to be found anywhere at all in the statistics provided by the Environment Agency. This means that "waste lead" is not regulated by the domestic law based on the Basel Convention.

In 1990, Japan exported the largest volume of its "waste lead" to Taiwan (see Table 4, for a breakdown by country and area), but later, because of a pollution problem, the volume dropped, and in the 1990s the volume of "waste lead" exported to Indonesia increased. In 1994, in an effort to conform to the terms of the Basel Convention, the general volume of waste exported was reduced, but lately the export of waste has begun to increase again, in particular and in large quantities to South Korea and India. "Waste copper, code number 7,404", the export of which amounts annually to about 50,000 tons, has not been regulated, while over the year 1997 the export of waste plastics amounted to nearly 120,000 tons.

The Basel Convention was revised in 1995 to regulate the export of hazardous waste (including material to be recycled), and it established a list of waste (effective from 1997) that member countries of the OECD would be prohibited from transfer-

Table 4. Japanese Export of Lead Waste and Scrap to Countries

(Unit: ton)

Year	1990	1991	1992	1993	1994	1995	1996	1997
Korea	2,464	1,033		34	150	804	5,721	9,344
China	933	3,204	4,918	539	15	51	18	20
Taiwan	9,568	1,748	16			62	148	
Hong Kong	2,376	1,602	245	205			6	
Thailand	720	4,330	4,104	2,500				
Philippines	10	8	33	833	120		40	
Indonesia	8,832	13,319	11,222	3,379			649	956
India	547	39	672	672			1,093	4,953
Subtotal	25,528	25,261	20,614	8,162	304	1,195	8,018	15,615

Note) A few exporting opponents in each year are not counted in the total.

Source) The Ministry of Finance, *Monthly Report on Japanese Trade*.

ring to non-member countries. The revision attaches a supplement which states that "the export of waste which the treaty regards as harmless has been excluded". Consequently, no proper list has yet been confirmed of types of waste that still need to be regulated.¹⁵

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15 Three kinds of waste are listed ;

List A : Hazardous waste included in the treaty under embargo

List B : Waste not regulated by treaty

List C : Material not confirmed waste

List B includes unscattered copper debris, mine waste, waste plastics (standard conformity substances), and so on.