Return, Reuse and Recycling of IT Products: The Japanese Approach

1. Current Situation of Recycling of PCs

Electric products such as PCs are now in wide use and have become indispensable in the preservation of our society.

However, it is estimated that every year approximately 65,000 tons of used electric appliances (such as computers and printers) and 48,000 tons of copiers, etc. are discarded. Furthermore, this ranks second, following automobiles (total 30-40%), as this year's main source of shredder dust.

If we were to divide these products into large groups by usage, we would have home appliances, electric products, and office equipment. When looked at from a usage, design, weight, and price vantage, it can be seen that there are a variety of products available.

In addition, distribution and usage take on a variety of forms. After being sold, manufacturers become less and less involved. With leases and rentals, however, even after sales are concluded, manufacturers are active to some degree in regular maintenance.

Waste can take on a variety of forms also. Wastes mainly discarded from households are treated as general waste; from businesses, it is treated as industrial waste. Even in those situations where products are similar, waste is divided accordingly as household or industrial waste, on the basis of where it is disposed.

Approximately 20% of large-sized home appliances are collected and treated as general household waste by cities and towns. Additionally, retailers collect approximately 80%. Of this 80%, approximately 3/4 is treated by private businesses; the remaining 1/4 is treated by cities and towns. However, small-sized home appliances show a high percentage of collection and treatment by cities and towns.

In comparison, equipment discarded from offices, such as electric products and office equipment like as computers / related products and copiers, etc. are managed relatively smoothly by private businesses. Parts with high resource worth and materials are recycled through dismantling. Of these products, the number arising from households is small; these are treated by cities and towns.

Where businesses are involved, treatment and management laws generally focus on shredding, separation and retail of metals, and reclamation and treatment. In cases where this process is carried out by cities and towns, there are times when adopted laws are similar or identical to those of businesses. On the other hand, there may be some differences; sometimes after shredding, there is no separation of metals and materials are then reclaimed. Additionally there are cases where products may not be shredded but will be reclaimed. In this way, it cannot be said that the current standards for management of electric appliances and products are satisfactory.

2. System of Laws and Regulations in the Creation of a Resource Recycling Society in Japan

2.1 Overall Framework

During the assembly convened in the spring of 2000 in Japan, four new laws were enacted for the development of several actions and frameworks for the creation of a resource recycling society. Additionally, two existing laws were revised. The legislation and revised laws are as follows:

① New Regulations	a. The Basic Law for Establishing the Recycling-based Society
	b. Law on Promoting Green Purchasing
	c. Construction Material Recycling Act
	d. Food Recycling Law
② Revisions	e. Law for Promotion of Utilization of Recycled Resources (Law for Promotion of Effective Utilization of Resources – 1991)
	f. Waste Disposal and Public Cleansing Law

In addition, in Japan the following laws were enacted:

g. The Basic Environment Law (1993)

h. Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging (Container and Packaging Recycling Law (1995))
i. Electric Household Appliance Recycling Act (1998)

Through these nine laws, a system of laws and regulations for the promotion of a resource recycling society was established.

These laws and regulations are illustrated in Annex 1.

The outline of framework laws are as follows.

- In the Basic Environmental Law, principles regarding environmental protection were laid down and policy items outlining the obligations of the country, local governments, businesses, and citizens were enacted. Based on this law, a basic environmental plan was enacted. This basic plan would bring together a course of environmental policies by combining 4 keywords: circulation, symbiosis, participation and internationally-minded actions. By recycling materials in an economic society, circulation aims towards the realization of a system where the burden on the environment can be reduced as much as possible and recycling is the underlying objective.
- The Basic Law for Establishing the Recycling-based Society is law that forms a general framework. With the establishment of a foundation for the general and planned promotion of waste and recycling policies, this law aims to promote practical actions for the creation of a resource recycling society, existing mutually with waste and recycling laws. This was the first time priority ranking of management was enacted by law (1. Development control; 2. Reuse; 3. Processed reutilization; 4. Heat recovery; 5. Appropriate disposal). In addition, it indicated the roles of concerned parties, with the government enacting a basic plan to establish a recycling-based society.

The outline of laws indicating the general structure is as follows.

- Waste disposal and recycling laws that complement one another are being enacted to indicate a general structure for the promotion of proper waste disposal and recycling.
- The waste disposal law indicates regulations related to the proper disposal of waste, establishment of waste disposal sites, and persons responsible for waste disposal, in addition to the establishment of waste disposal standards.
- The recycling law points out indications for resource recycling, a simple system of recycling products, quality of laborers, and sorting / recovery.

The outline of laws in response to the special qualities of individual commodities is as follows.

- The enactment of a framework for waste disposal and recycling in response to the special qualities of individual commodities is reflected in the Container and Packaging Recycling Law, Electric Household Appliance Recycling Act, Construction Material Recycling Law, and Food Recycling Law.
- The Container and Packaging Recycling Law identifies the duties of all parties concerned: separation by citizens, separation / sorting and intermediate treatment by local governments, and recycling by business parties that produce / use containers and packaging.
- The Electric Household Appliance Recycling Act identifies the duties of all parties concerned: collection of used appliances by businesses, recycling of products by manufacturers, and other related parties.
- The Construction Material Recycling Law identifies the duties of all parties concerned: separation / dismantling of construction materials by parties receiving orders for construction, recycling of construction wastes, etc.
- The Food Recycling Law identifies the duties of all parties concerned: recycling and decrease in food wastes by manufacturers, processing industries, and food product retailers.

2.2 Outline of Recycling Law

The Recycling Law enacted in 1991 was instituted to indicate roles in the recycling of materials such as old papers, glass containers, scrap materials, and coal ash, etc., separation and collection of steel cans, etc., and promote plans for the recycling of home appliances. However, this alone did not halt the increase in waste. With a growth in the longevity of products and the necessity of promoting increased collection by manufacturers, the law was revised in 2000.

The revisions follow below.

- Regarding the large number of waste products such as automobiles, PCs, large-sized furniture / electric products, etc., concerned parties are under obligation to institute programs, etc., for designs and manufacturing plans for resource conservation and longevity, refine the repair system and upgrade products.
- Targeted products are specified by government ordinance. Based on discussions between the Minister of International Trade and Industry and the Minister of the Environment, standards for actions are specified by the ministries regarding actions taken by business parties to increase resource conservation (decrease raw materials used to make products) and longevity of products, in addition to refining renovation systems for targeted products. In cases where the Minister of International Trade and Industry decides that actions taken by business parties are insufficient when compared with outlined standards, the Minister may provide recommendations for the party, make a party's name public, or issue an order.

- Regarding the reuse of used product parts (automobiles, PCs, copiers, etc.), business parties are under obligation to carry out simple product designs and manufacturing with used parts and reuse parts taken from products when creating new products.
- Targeted products are specified by government ordinance. Based on discussions between the Minister of International Trade and Industry and the Minister of the Environment, standards are specified by the ministries regarding actions by business parties to utilize reused parts and arrangements for the reuse of recycled resources. In cases where the Minister of International Trade and Industry decides that actions taken by business parties are insufficient when compared with outlined standards, the Minister may provide recommendations for the party, make a party's name public, or issue an order.
- Regarding efficient collection and recycling of PCs and secondary cells, etc., business parties are under obligation to collect these products. Targeted products are specified by government ordinance. Based on collaboration between the Minister of International Trade and Industry and the Minister of the Environment, standards are specified by the ministries regarding targeted items that should be collected and recycled by business parties. In cases where the Minister of International Trade and Industry decides that actions taken by business parties are insufficient when compared with outlined standards, the Minister may provide recommendations for the party, make a party's name public, or issue and order.

The Recycling Law scheme is illustrated in Annex 1. This law will be put into effect on April 1, 2001.

The obligations and duties of business parties are currently under discussion at a council of MITI. However, the following outcomes are expected to emerge with regard to PCs.

- Reuse of hard disk drives and memory will be simplified, and structures designed for easy dismantling to provide upgrade opportunities.
- Raw materials will be indicated in parts over fixed amount.
- Possibility of separation by regular tools / means.
- Collection of used PCs by business parties.
- Indication of conditions for collection at that time.
- Points to be enforced in recycling of collected PCs by manufacturers.
- Achievement of the necessary fixed recycling rate by an indicated year.

In the collection of PCs indicated in these regulations, expected fees and collection methods by business parties will be made public. It is also expected that it will be a system in which persons in possession of these used PCs (citizens, etc.) will be responsible for these fees (including transport

fees), with business parties carrying out the collections. Therefore, the recycling rate will equal the ratio of the weight of used and collected products to the weight of reused raw materials (not the collection rate of waste products).

2.3 Recycling Specification Guidelines

In 1994, guidelines outlining the creation of a preparatory assessment of product designs conducive to the promotion of reusing recycled resources were presented by the MITI Industrial Structure Council. The following points were indicated in the guidelines for home appliances and PCs:

- Simple programs for recycling
- Shortened disassembly time
- Use of recycling resources
- Indication of the quality of raw materials

Whether or not these guidelines are observed is at the discretion of each concerned party. In addition, regarding to what extent these guidelines are applied in businesses, there has not been formal studies, however, it can be thought that these guidelines are being followed to some extent.

2.4 Eco-Mark

In Japan's eco-labeling system (the eco-mark system), approved standards for personal computers were enacted in September 2000. Within these approved standards, designs for recycling, collection / recycling systems and chemical substances, among others, were enacted. A checklist of suitable plans for recycling equipment is outlined in Table 1. The first product application conforming to these standards was filed by NEC in September and approved.

3. Effects and Issues in Environment and Economics

The scheme of collecting and reusing PCs in Japan that has been mentioned to this point has been a summary framework. In reality, it is speculated that a system able to function within society would

take years to emerge. Therefore, it is difficult to establish the environmental and economic effects and issues at the present standpoint.

3.1 Issues Regarding the Electric Household Appliance Recycling Act in its Preparatory Stages

Coming before PCs, the Electronic Home Appliance Recycling Law will be enforced from April 2001. In these preparatory stages at least, a number of issues are clear. With regard to large televisions, air conditioners, washing machines, and refrigerators, this home appliance recycling system will involve:

- Manufacturers collecting used home appliances
- Indicating collection conditions at that time
- Manufacturers carrying out the necessary enforcement of recycling collected PCs
- Achieving the necessary fixed recycling rate by an indicated year.

At this time, this collection and recycling system is being prepared by electric household appliance manufacturers.

The largest problem faced by business parties is acquiring the funds to collect these used home appliances (expenses necessary for disposal and recycling). Collection prices are as follows: refrigerators: 4,600 yen; air conditioners: 3,500 yen; televisions: 2,400 yen; washing machines: 2,400 yen (consumers will bear collection and transport fees). Because business parties charge similar collection fees, there is no incentive for consumers to purchase a product that is more recycle-friendly. In other words, consumers will not purchase those products that are easier to recycle.

It has been said that the presently published collection fees are lower than the actual expenses for handling and recycling. The reasons put forth by manufacturers for these inexpensive fees is the fear that if collection fees were higher, consumers would, instead of buying new appliances and products, continue to use their current appliances for longer periods of time. However, because of

these low collection prices, there is concern that there will be no incentive for consumers to use products for longer periods of time.

Because business parties have established inexpensive collection fees, it has become necessary to put forth efforts to diminish the difference between those fees and the actual handling and recycling expenses. This is related all the more to the promotion of the electric household appliance recycling system.

The second issue is that not every home appliance is collected and recycled by business parties. In particular, it is limited to large-sized televisions and refrigerators, with the result that actual waste management risks exceed environmental risks (There is a greater necessity for difficult collection, transport, and handling of large sized products, in addition to the capacity of reclaimed land.). Because of this, the disposal of small-sized televisions and home appliances, other than the four mentioned previously, falls again to local governmental bodies.

3.2 Issues of Reusing and Recycling PCs, etc.

Issues to be enforced in the recycling of PCs, etc., over the next few years will no doubt reflect those of home appliance manufacturers.

First, there is the issue of the establishment of collection fees and providing an incentive for consumers to select a PC that is easy to recycle. Furthermore, there is the issue of whether or not there is an incentive for consumers to continue to upgrade and use those products already in their possession.

Second, with PCs, the trend towards miniaturization is remarkable, overtaking even the largest PCs. In particular, in recent years, with the increase in e-mail use on cellular phones and mobiles in Japan, large quantities of mobiles that connect to cellular phones are being sold. While these products are not PCs, focus has turned to the treatment of these types of communication products. A major focus may also be placed on the collection and recycling of toys for not only children, but also young adults (PlayStation, Nintendo 64, Game Boy, etc).

3.3 Environmental Strain Following the Disposal of OA Equipment

The resources committed in the shredding and sorting of 1 ton of disposed OA equipment (PCs (hard drives, monitors, keyboards, printers), photocopiers, phones, modems, etc.) used at companies and collected as industrial waste by business parties can be found in Table 2, as follows.

Table 2:

Resources Committed during Shredding and Sorting of 1 Ton of Disposed OA Equipment

Committed Resources	Committed Amount	Committed Resources	Committed Amount
Electrical Power	22.89 kwh/t	Light Oil	2.941/t

In addition, components of disposed OA equipment following shredding can be found on Table 3, as follows.

Table 3:

Components of Disposed OA Equipment after Shredding (Weight Comparision)

Items	Rate (%)	Flow of Treatment after Shredding
Shredding Chips (30-50mm)	42.1	Non-ferrous metals excluding aluminum, waste plastics → Non-ferrous Refinery
Shredding Chips (less than 7mm)	11.8	Non-ferrous metals → Copper manufacturers → Non-ferrous Refinery
Dust Recovery	13.5	Recovered sections by ash collector → Non-ferrous Refinery
Steel	31.8	Electric converter maker
Aluminum	0.8	Aluminum secondary metal maker

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