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Performance One Year After the Implementation of the Containers and Packaging Recycling Law: 66,422 tons Recovered for Recycling The Future of Recycling as Viewed in a Comparison with Germany

Over a year has passed since the "Law for Promotion of Sorted Collection and Recycling of Containers and Packaging" (the "Containers and Packaging Recycling Law") went fully into effect. This Law had targeted PET bottles since 1997, and in April 2000, a new category was added to cover "other plastics"-that is, plastics not including PET bottles and white PSP (polystyrene paper) trays.

The volume of "other plastics" collected for recycling in fiscal 2000 based on the Containers and Packaging Recycling Law, as announced by the Japan Container and Packaging Recycling Association, was 66,422 tons, which represents a 63.8% achievement rate compared to the planned volume of 104,165 tons. If we look at separate recycling methods, we find that blast furnace

chemical recycling is most prominent, accounting for about half of all recycling.

It will take some time before the system is firmly established, but one year after the implementation of the Containers and Packaging Recycling Law, the plan is coming into focus-although dimly-thanks to the understanding and efforts of consumers, local governments, and businesses.

In this issue, along with reviewing performance in the first year after implementation of the Containers and Packaging Recycling Law, we will examine the future of containers and packaging recycling in Japan, and also include a look at the state of affairs in Germany, which had a head start on Japan in terms of recycling activities.

1 One Year After the Start of the Containers and Packaging Recycling Law

Fiscal 2000: Collected Volumes for Recycling Reach 63.8% of Projection

A year has passed since the Containers and Packaging Recycling Law was put fully into effect, and the Japan Container and Packaging Recycling Association (JCPRA)-a corporate body designated by the Japanese government to promote recycling activities-has announced the status of product recycling for this one-year period based on the Recycling Law.

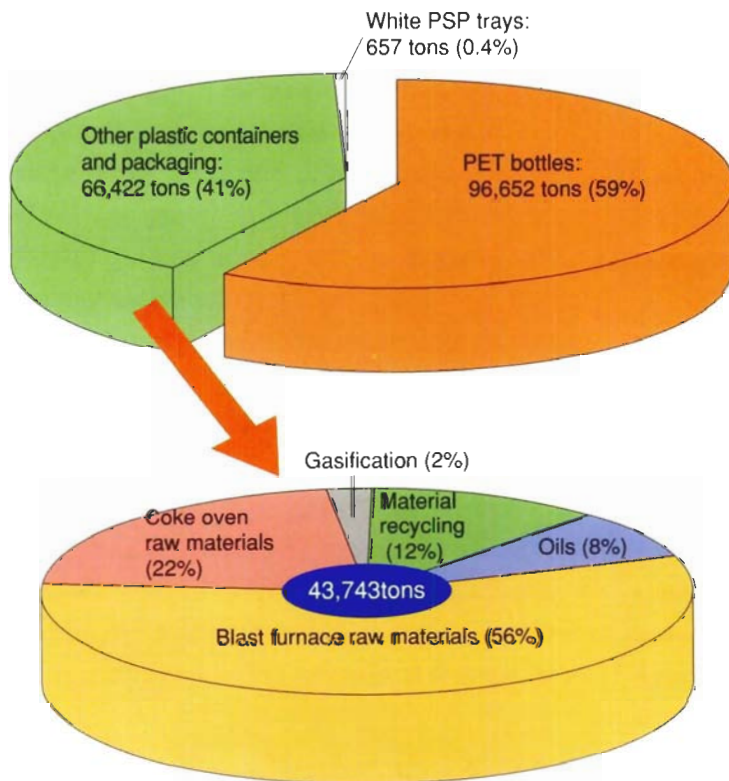
According to this announcement, a total of 106,418 tons of recyclable "other plastics" was expected to be recovered from local governments for material recycling (reproduction of usable materials)

and chemical recycling (gasification, liquefaction to produce oils, and recycling for blast furnace raw materials and coke oven raw materials).

The actual volume of these "other plastics" collected for recycling was 66,422 tons, which represents a 63.8% achievement rate in terms of the originally projected volumes.

—Blast furnace raw materials account for 56% of "other plastic" volumes by recycling method—


Performance in Collected volumes of plastic containers and packaging for recycling (FY2000)



Breakdown of actual performance by recycling method for "other plastics" (excluding white PSP trays)

Let's look at the breakdown of recycling methods. According to the data for FY2000 as announced by the JCPRA, material recycling accounted for 12% of recycling for "other plastics"; chemical recycling for liquefaction accounted for 8%; blast furnace raw materials (for steel production) 56%; coke oven raw materials 22%; and gasification 2%.

In terms of this breakdown, the ratio of blast furnace raw materials has drawn considerable attention. Production of blast furnace raw materials refers to a method in which waste plastics are transformed into a reducing agent for the production of pig



iron from iron ore, which in turn is used to make steel products.

In Japan, around 120 million tons of iron ore are used each year in steel production, and the volume of coke required for the reducing agents used in this production process is about half that, at around 60 million tons. Blast furnace raw materials technologies are aimed at using waste plastics as a replacement for cokes to the greatest extent possible—in other words, at efficient recycling.

Difficult to achieve desired result in only one year

Without doubt, an achievement rate of 63% for the first year may be considered “successful” or “disappointing,” depending on one’s point of view. In any case, the first issue that comes to mind is that further preparations are still required for the implementation of recycling systems based on the Containers and Packaging Recycling Law.

As of June 2000, according to the JCPRA and the Ministry of Health, Labor, and Welfare, 1,348 of the 3,233 local governments across Japan—roughly 42%—had made plans for the sorted collection of waste based on the Containers and Packaging Recycling Law. Only 493 of these local governments, however, had actually made applications to the JCPRA for this collection.

One possible reason for this may be that sorted collection methods and processing methods differ from one local government to the next, but the most significant background factor was the lack of time for development of systems based on the Containers and Packaging Recycling Law.

In addition to this lack of time, other potential problem areas may have been that sorting methods are hard to understand for consumers—the source of

many waste materials—and that it is very difficult for local governments to estimate the volume of materials to be collected each year and then use these estimates to calculate volumes for yearly plans.

Another issue is that consideration must be given to the perspective of recycling businesses; for example, how does one go about reusing plastics in new products? Which fields are appropriate for these recycling applications? And what types of advanced technological development should be promoted in order to achieve an ideal recycling system?

In any case, the implementation of the Containers and Packaging Recycling Law has only just begun in earnest. In order to promote its application, and to create a true “Recycling-oriented Society,” we must first encourage the effective use of resources targeted by this Law as an issue for all citizens.

Perhaps the most important part of this process is for consumers, local governments, and recycling businesses to work together to build a sustainable recycling system, through the effective use of the many existing recycling technologies and the new technologies that are gradually being developed.



2. The Future of Recycling and the State of Affairs in Germany

Germany: Chemical Recycling in Large Volumes (1999)

Recycling of plastic containers and packaging in Japan, based on the Containers and Packaging Recycling Law, has really only begun. In this issue, we will examine the directions for the future through a comparison with Germany, which had a considerable head start on Japan, having created a system for container and package recycling in 1991.

Roughly equivalent scale of plastic production and consumption

If we look at plastic production volumes in 1999, we find that Japan produced 14.57 million tons, while Germany produced 14.1 million tons. Of these volumes, domestic consumption was 10.81 million tons in Japan, and 8.9 million tons in Germany.

In Japan, the segment of domestic consumption volume recognized as “waste plastics” is 9.76 million tons (expressed as estimated “discharge volumes”), which is very close to the total volume for domestic consumption. On the other hand, the volume shown in statistically studies in Germany is 3.6 million tons (expressed as “collected volumes”), which is no more than 40% of the total volume for domestic consumption—a considerable difference from Japan.

It should be noted, however, that waste plastic volumes are expressed as “discharge volumes” in

Recycling volumes for waste plastics by method (unit: million tons)

	Japan	Germany
Material recycling	1.34 (13.7%)	1.35 (37.5%)
Chemical recycling	0.13 (1.3%)	0.33 (9.2%)
Thermal recycling	3.05 (31.2%)	0.42 (11.7%)
Landfill / simple combustion	5.24 (53.6%)	1.50 (41.7%)

(Source) Japan : Plastic Waste Management Institute(PWMI)
Germany : Association of Plastics Manufacturers (VKE)

Japan and as “collected volumes” in Germany; the difference in these numbers results in part from differences in the statistical interpretation. The fact remains that an accurate analysis of this difference has yet to be undertaken.

One explanation is offered by Takeshi Katsumata, Former General Manager of the Surveys Department at PWMI, who has participated in surveys in Germany four times including the survey for 2001. Katsumata says, “Persons in the plastics industry in Germany explained that the collection rate for waste plastics is relatively low because of the high ratio of plastics use in the field of durable consumer goods.” This may indicate that a difference in national character between Germany and Japan are reflected in waste plastics volumes as well.

Now, let us look at the specific conditions surrounding the recycling of waste plastics.

Chemical recycling in Germany three times that of Japan

If we use this data to compare the situations in Japan and Germany, we find that the total of recycled volumes (material, chemical, and thermal) in Japan is 4.52 million tons, or more than twice the total volume of 2.1 million tons for Germany.

Looking at each field individually, we can see that the volumes for material recycling are roughly the same for both countries, but that there is a significant difference in the case of chemical recycling, where the volume for Germany is just under three times that for Japan. Another notable feature of this data is that the volume for thermal recycling (heat recovery) in Japan is roughly eight times that of Germany. This is one of the main factors in the large total recycling volume in Japan.



Background to Recycling Methods in Germany

Chemical and thermal recycling used in addition to material recycling

In Germany, when the first Packaging Ordinance on the disposal of containers and packaging materials (equivalent to the Containers and Packaging Recycling Law in Japan) was promulgated in 1991, "recycling" referred mainly to material recycling.

According to this Ordinance, makers of containers and packaging, and distributors using these items, were obligated to recover and recycle the waste containers and packaging materials discharged from households, and Duales System Deutschland AG (DSD), a private enterprise, was established to undertake these collection and recycling activities.

It appears, however, that achieving the designated recycling rate was no easy task. In the midst of this situation, proposals from the plastic manufacturing industry led to the legal acceptance of chemical recycling such as gasification, liquefaction to produce oils, and recycling for blast furnace raw materials, bringing about a diversification in recycling methods.

With the implementation of the "Recycling and Waste Management Act" in 1996, thermal recycling (heat recovery) was added to the definition of recycling technologies along with materials and chemical recycling. This was because it had become apparent that the required recycling volumes could not be achieved through material recycling alone.

Then, with the third amendment to the Ordinance in 1998, the targeted ratio for material recycling was separated from the ratios for chemical and thermal recycling. At the same time, a new clause was incorporated into the Ordinance by which DSD was obligated to collect and recycle

only containers and packaging materials used by manufacturers and distributors with which DSD had contracts, as well as product manufacturers and product importers that used these containers and packaging materials ("manufacturers and others").

According to this amendment, 60% of all containers and packaging must be collected, and 60% of the materials collected (36% of the total) must be subject to material recycling. The remainder may be recycled using either chemical or thermal recycling.

From misunderstanding to understanding : thermal and chemical recycling

In Germany ten years ago, the generation of dioxins through waste incineration had become a major social issue. And because chemical recycling often involves "being subjected to high temperatures in a furnace," it is often confused with incineration.

This resulted in a rejection of both thermal and chemical recycling as a form of acceptable recycling in the public eye.

Currently, however, chemical recycling has gained considerable importance, and it has become common knowledge that the use of waste plastics, particularly in blast furnace applications, is extremely useful in terms of reducing the consumption of resources.

Furthermore, cogeneration type facilities are now being constructed in combination with heat recovery functions-for example, as regional heating and electric power generation facilities-and thermal recycling is gradually gaining acceptance among German citizens.

In this way, the seeds have finally been planted for the establishment of a recycling system that incorporates both thermal and chemical recycling.

Collection Systems in Japan and Germany

Local governments collect garbage, and private enterprises collect resources

In Germany, as in Japan, the processing of ever-increasing volumes of containers and packaging waste had become a serious problem. When the Ordinance was promulgated and implemented in 1991 and manufacturers and others became obligated to undertake recycling activities, DSD was established to take on these collection and recycling activities.

Manufacturers and others with recycling obligations commissioned these collection and recycling operations to DSD.

The name “Duales System” refers to the dual collection system in which local governments collect garbage, and private enterprises collect used containers and packaging materials that can be transformed into resources.

Identification marks on targeted containers and packaging materials

In this system, after acquiring permission from DSD, manufacturers and others that have contracted recycling operations to DSD display the “GP” (“Gruene Punkt” or “Green Dot”) mark on various plastic containers, packages, beverage packs, and cans (referred to as “light packaging”). This mark indicates that the item in question is targeted



“GP” mark displayed

for commissioned recycling, and that a recycling commission fee is being paid. The fee is roughly 180 yen per kilogram for plastic containers and packaging; about 80% of this covers collection costs, and the remaining 20% or so is for recycling costs.

DSD distributes recycled “Yellow Bags” to households, and the “light packaging” materials discharged from these households—that is, materials from manufacturers and others that have commissioning contracts—are then collected using these bags.


In reality, for the operation of this system, separate recycling activities—collection, separation, and production of raw materials—are further commissioned to specialized recycling businesses that have contracts with DSD.

Mixed collection of plastic containers and packaging materials

Based on the Japanese Containers and Packaging Recycling Law, sorted discharge of waste is the obligation of consumers, and sorted collection is the obligation of local



Waste disposal using “Yellow Bags”



governments (some local governments have adopted independent collection methods). In the collection system operated by DSD in Germany, however, all plastic containers and packaging are collected together.

This is because technologies have been developed to transform plastics into raw materials that can be used for both material recycling and chemical recycling, even if these plastics are collected together. In this way, Germany has established a system by which consumers can easily participate in recycling activities without having to take the time and trouble to sort plastic containers and packaging.

In Germany, garbage collection costs, and recycling routes are free

As all Japanese are aware, local governments use taxes to cover the costs of sorted collection based on the

Containers and Packaging Recycling Law in Japan. Because this system appears to be free as far as the consumer is concerned, there may be a tendency for these consumers to dispose of sorted waste plastic as though it were garbage.

In this regard, in Germany a fee is collected when waste plastics are disposed of as regular garbage, and as a result consumers have become ingrained with the desire to reduce the volumes of garbage discharged as much as possible.

On the other hand, if light containers and packaging (plastic containers and packaging, beverage packs, and empty cans) are placed in Yellow Bags and put on DSD collection routes, the consumer no longer needs to directly bear the costs of collection. This recycling system offers great advantages for the consumer, and the volume of materials collected for recycling has increased as a result.

Sustainable Recycling Systems

The key is to create a system that consumers can adapt to easily


Katsumata has said that “Collection in Germany using DSD’s methods plays an extremely important role in terms of promoting progress in the measures for processing rapidly increasing volumes of containers and packaging material.” It is safe to say that the origin for the concept of DSD’s recycling system can be found in Germany’s approach to recycling.

Recycling of glass bottles and paper (newspapers etc.) has been going in Japan and Germany for many years now, and is a natural part

of everyday life in both countries, so sorted disposal and collection is very well established. Recycling of “other plastics” has only just begun in Japan, however, and sorted disposal and collection has yet to take root.

It takes time for a society to become familiar with any new system. This is evident in Germany as well, given that the Ordinance implemented in 1991 had been amended three times by 1998.

In any case, the German government determined that a “sustainable recycling system” was one in which consumers could participate in the DSD method comfortably and without excessive time or effort. Based on this judgment, it initiated



mixed disposal and collection of containers and packaging, and placed priority on increasing volumes of recycled materials.

Increasing attention on chemical recycling in Japan as well

As we stated at the outset, in a breakdown of recycling methods during FY2000, the ratio for blast furnace raw materials was 56%. This is quite a high percentage, even considering that the figure is limited to "other plastics."

The Japan Steel Federation has indicated that in 2010, a total of one million tons of plastic waste could be recycled for use in blast furnace applications (including applications in coke ovens) based on the Containers and Packaging Recycling Law throughout the entire steel industry in Japan.

In the field of chemical recycling, significant progress has been made toward the practical application of new methods, such as gasification, in addition to recycling for blast furnace raw materials.

Given these circumstances, we can assume that just as in Germany, a greater emphasis will be placed on chemical recycling in the future in Japan as well.

Will thermal recycling gain popularity in Germany?

The volume of materials used for thermal recycling in Germany is dramatically less than that in Japan, but Katsumata predicts that in the future, thermal recycling will likely gain popularity in Germany as well. This is because

starting from 2006, substantial restrictions will be placed on landfill processing in Germany.

In the past, much of the 3.5 million tons of municipal solid waste (figure for 1993) became unprocessed landfill, but starting from 2006, use of waste for landfill will be prohibited unless that waste has first been processed through incineration. This means that one can fully predict certain plastic containers and packaging materials and other waste items unsuitable for material and chemical recycling will come to represent an increase in the volume of materials used for thermal recycling.

Toward sustainable recycling systems in Japan and Germany

Looking at plastic recycling volumes by method, it is clear that as noted earlier, Germany is more advanced than Japan in terms of chemical recycling, but that thermal recycling is undertaken on an overwhelmingly larger scale in Japan.

Nevertheless, Katsumata of PWMI and Deputy General Manager Tetsuhiro Hayashi of the German Chamber of Commerce and Industry in Japan predict that in both countries in the future, there will be growing trends toward adopting an effective balance of methods such as chemical recycling and thermal recycling in addition to material recycling.

This approach of "using waste suited to material recycling for material recycling and materials suited to chemical recycling for chemical recycling" is the key to a rational recycling system, and the path to ensuring effective, sustainable recycling.



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