

# Korea Environmental Policy Bulletin

Issue 1, Volume I, 2003

## Volume-Based Waste Fee System

### 1. Introduction

In order to reduce waste generation at the source and maximize waste recycling, the Korean government introduced the Volume-Based Waste Fee (VBWF) system in 1995.

In Korea, local municipalities have a responsibility to collect, recycle and treat municipal solid waste from household, small business and commercial sectors. Traditionally, all municipalities levied waste fee on each household through property tax or monthly lump-sum fee. Under this fixed-fee system, cost per each residence remained constant regardless of the amount of waste generated, which created a false impression that management services of municipal solid wastes are free of charge.

Households and commercial sectors are required to purchase designated VBWF bags to throw away their garbage under the VBWF system. This way, the public has more incentive to generate less waste because they pay for waste treatment in proportion to the amount they dispose. By providing a free collection mechanism for recyclable waste, VBWF induces the public to be more active in waste separation and promotes waste recycling.

After 8 years of implementation, the VBWF system has proved to be very successful in curbing the municipal solid waste generation in Korea. Between the periods of 1994~2001, municipal solid waste generation has decreased by 16.6 percent, and at the same time, the recycling rate increased from 15.7 percent in 1994 to 43 percent in 2001.

This first volume of the Korea Environmental Policy Bulletin gives an empirical review on the performance of VBWF system in reducing municipal waste in Korea.

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## 2. Policy Features

### 2.1 Objective

The main objective of the Volume-based Waste Fee (VBWF) system is two-fold: to impose waste treatment cost on each polluter based on the amount of waste generated, and to provide free collection service for recyclable wastes, thereby inducing reduction in generation of wastes at source and encouraging the collection of recyclable wastes.

In the past, waste collection fee was charged on a fixed rate through property tax or monthly fee regardless of the amount disposed. However, with the introduction of VBWF system, households and small sized commercial sectors are required to purchase specified bags to throw away their garbage, thus waste collection fee is charged in proportion to the amount thrown away. Furthermore, by providing free collection service for recyclable waste, incentive is given for households to separate recyclable items from other solid waste.

In Korea, with respect to the responsibility of managing municipal solid waste from household and small quantity generators of business and commercial sectors, local municipalities have a responsibility to collect, recycle and treat municipal solid waste and central government has a responsibility to make national waste management plan and to provide technical and financial supports to local government. Traditionally, all communities in Korea paid for waste management services through property tax or monthly lump-sum fee levied on each household. Under this fixed-fee system, cost per each residence remained constant regardless of differences in the amount of waste generated, which created a false impression to the citizens that management services of municipal solid wastes are provided free of charge. The local government that is responsible for managing municipal solid waste did not pay much attention on the reduction and recycling.

Rapid urbanization, population explosion and increases in income and consumption inevitably gave rise to mass generation of waste on an unprecedented scale. The changes in consumption pattern for most people preferring luxurious

goods also resulted in shortening of product life span and bring about early discard of recyclable products, such as furniture, home electronics and home appliances. Increases in overall consumption and use of disposable products, excessive packaging and amount of food preparation are creating even greater challenges for waste management authorities.

In Korea, municipal solid waste (MSW) generation increased sharply during the early 1990s and most of them went directly to landfill sites. However, due to the small land area and high population density, it was becoming difficult to obtain more land for landfill sites. The total amount of municipal waste generation was growing at 83,962 ton/day in 1990, 92,246 ton/day in 1991 and 75,096 ton/day in 1992. About 93 percent (78,016 ton/day) out of the total quantity of solid wastes were dumped into the landfills in 1990, about 89 percent in 1991, 89.2 percent in 1992, 86.2 percent in 1993, and 81.2 percent in 1994 respectively. Still, recycling rate remained at a low level, about 4.6 percent in 1990, 7.4 percent in 1991, 7.9 percent in 1992, 11.5 percent in 1993, 15.4 percent in 1994. With increased public concern for cleaner environment in their neighborhood, establishing landfill sites became more difficult.

For these reasons, finding ways to reduce waste generation was very crucial and issues associated with waste generation and management could not be resolved without efforts to reduce the growing amount of waste generation. Against this backdrop, the Korean government introduced the Volume-based Waste Fee System.

### 2.2 Target Waste and Waste Sources

The type of waste subject to the Volume-Based Waste Fee System is municipal solid waste from households, commercial sectors, small businesses and office buildings. The wastes from commercial sectors should be similar to those of household wastes, in that they can be collected, transported, stored, and treated in the same way as the household wastes.

The emission sources are residential houses, commercial sectors, office buildings, institutions such as schools and government, and small-sized businesses disposing of less than 300kg of waste

<Table 1> Waste Sources and Types

Source		Types of waste	Use of VBWF bag	Cost born by the Source	Notes
Household and small commercial sector	Urban area	Household waste	Yes	Yes	Separate collection
		Recyclable waste (paper, cans, bottles, metal, plastics)	No	No	Separate collection
		Bulky waste (furniture and electric home appliance like refrigerator, etc)	No	Yes	Separate collection
		Construction and demolition debris	No	Yes	Separate collection
		Food waste	No	Yes	Separate collection
	Rural village (farming/fishing)	Agricultural waste	No	Yes	Village-level VBWF
Large commercial sector/small business		MSW type <sup>1)</sup>	No	Yes	Large quantity generator more than 300kg/day

Note: 1) Large quantity generators were excluded from the system originally but are recommended to use VBWF if the waste type is similar to those that apply to the system.

<Table 2> List of Recyclable Waste

Categories	Items
1. Paper	- Newspaper
	- Book, note, paper bag, calendar, packaging paper
	- Paper cup, Paper pack
	- Box (snacks, packaging, others)
2. Cans	- Steel can, aluminium can (drink, food)
	- Other cans (butane gas, pesticide container)
3. Bottles	- Drinking water bottle, the other bottles
4. Metal	- Scrap iron (engineering utensil, wire, nail, iron board, etc)
	- Nonferrous metal (nickel silver, styrene, electric wire)
5. Plastics	
- Extended Polystyrene	- Fruit box, etc
- PETE (1)	- Drink bottle(coke, soda, juice), water bottle, soy sauce bottle, oil bottle
- HDPE (2)	- Water bottle, shampoo and detergent container, white rice wine bottle
- LDPE (4)	- Milk bottle, rice wine bottle
- PP (5)	- Boxes (beer, coke, soju), garbage can, dustpan, water gourd dipper
- PS (6)	- Yogurt bottle, shawa bottle
6. Textiles	- Cotton
	- Other clothes
7. Waste from farming village	- Pesticide bottle
	- Waste vinyl for farming
8. Others	- Recyclable items depend upon regional circumstances

per day. Large-scale generators producing more than 300kg per day are not subject to the VBWF system and they are required to treat wastes on their own responsibility. They can commit waste collection and treatment to private hauler.

The system does not apply to burnt coal briquettes, recyclable wastes and bulky wastes such as discarded refrigerators and furniture. Recyclable wastes are distinguished into 4~5 categories - paper, metal cans, glass bottles, plastic, other metals - and are emitted separately. Bulky wastes such as home electronics, home appliances and furniture are also excluded from using the designated trash bags, but are charged for their collection and disposal. For disposal of bulky wastes, a sticker should be purchased from the county or city district offices. The price of the sticker is decided by each municipality according to the type and size of the item to be discarded. Bricks and tiles generated from the construction work are categorized as construction and demolition debris, and need to be discarded in a bulky sack specified by the local government. Food wastes were discarded in VBWF bags with the other solid waste at the early stage of the VBWF system. However, to promote re-utilization of food waste, it is now collected in designated food waste bins or bags.



## 2.3 Specifications of VBWF Bag

Korea has adapted to using bags over containers for several reasons. In Korea, population density is high and large number of the population live in apartments and condominiums. Even regular houses are in close proximity with its neighbors and are adjacent to the road, thus it is difficult to place large garbage collection bins in front of the house.

Types of waste collection containers to base rate and billing system are generally cans, prepaid bags, prepaid tags or stickers. Each system has specific advantages and disadvantages such as providing economic incentive for waste reduction, assuring stable revenue for waste agencies simplicity of billing, easy collection of waste, sanitation and budgetary constraints. For container system, authorities need to set up an inventory and distribution system, which are expensive to install, and its billing system is more complex. Prepaid bags are more advantageous since they are relatively inexpensive to implement because residents pay for the collection and treatment of wastes by purchasing bags and no billing is required. Less hassle is involved for pre-paid bags because public pays directly for the purchase of the bag and no billing is required.

Considering Korea-specific housing conditions, budgetary constraints and facilitation of implementation, volume-based prepaid bags, instead of containers have been chosen for the Volume-Based Waste Fee System in Korea.

Each municipality can choose the appropriate type, color and materials of the designated VBWF

<Table 3> Composition of VBWF Bag

Composition		Primary Usage	Note
PE	HDPE	Bags for general use	
	LDPE	Bags for general use	
AP+starch+LDPE (biodegradable)		Bags for food waste compost-use only	Aliphatic polyester
AP+starch+HDPE (biodegradable)		Bags for food waste compost-use only	
CaCO <sub>3</sub> +HDPE (LDPE)		Bags for incinerator-use	Contains more than 30% of Calcium Carbonate (CaCO <sub>3</sub> )

Notes: There are different quality standards on each composition type, and bags are made in accordance with the standards.

bags, taking into consideration of their unique situation, e.g. treatment facilities capability, convenience for the residents, environmental suitability, etc. The composition of VBWF bags are PE (polyethylene), PE with more than 30 percent of biodegradable resin or PE with more than 30 percent of calcium carbonate. Tensile strength and other specific standards are set for each bag with different composition. The bag containing calcium carbonate is primarily used for incineration treatment and biodegradable resin bag is used for food waste compost. The color of the bag for household use should be translucent or obscure to protect personal privacy. Bags for public use (street cleaning, etc.) are light blue colored and are not used interchangeably with other VBWF bags. The bags for food waste disposal should be transparent to avoid mixture of different substances.

There are various sizes of VBWF bags for residents' convenience. General use bags come in standard volumes of 2, 5, 10, 20, 30, 50, 75, 100 liter sizes; public use bags come in 30, 50, 100 liter sizes and food waste bags come in 1, 2, 3, 5 liter sizes.



## 2.4 Rate of VBWF Bag

Payment system of the Volume-Based Waste Fee in Korea is a direct payment system, where residents pay for solid waste services by purchasing the standard bags. The cost for waste treatment is recovered from the sales of VBWF bags. Therefore, the price of a VBWF bag includes collection, transport and treatment cost as well as production costs of making the bag. In principle, the full cost of collection, transport and treatment should be included in the price of the VBWF bag. However, the price of bags are gradually increased because a sudden increase in the waste treatment cost might cause negative side effect. Therefore, each municipality sets a different rate of burden (resident's share of the full cost) for the public depending upon its financial circumstances and treatment cost.

For waste that is difficult to be contained in VBWF bags (i.e. small quantity of demolition waste debris, bulky wastes, other wastes from small business sector), the total treatment cost is levied on the generator.

## 2.5 Distribution and Sales of VBWF Bag

VBWF bags are sold at local grocery stores, convenience stores and other markets which are in close proximity and are easily accessible to the public. There are approximately 100,000 stores nationwide. Local government can supply VBWF bags to these stores directly or consign the distribution of VBWF bags through financial institutions or cleaning agencies.

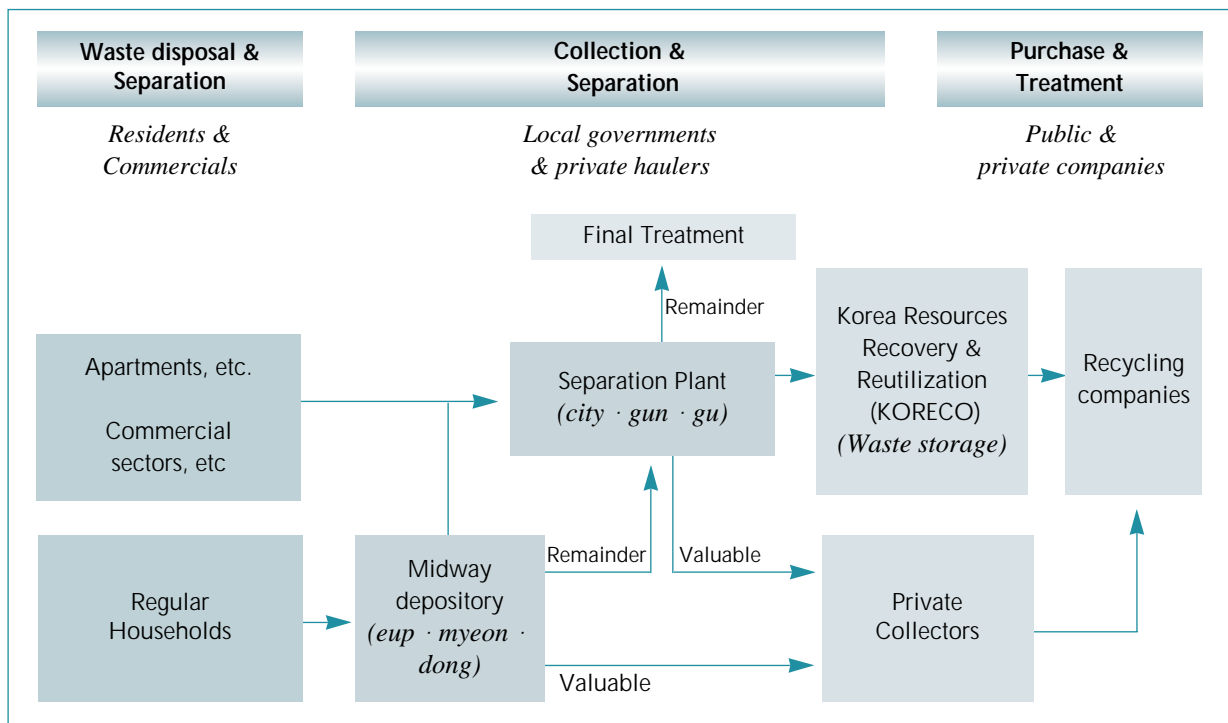
## 2.6 Waste Collection

Waste collection time is set by the local municipality who takes into consideration its unique conditions. For aesthetic reasons, most municipalities set waste discharging time after sunset (after 8 p.m) in the evening prior to the day of the waste pick-up. Residents living in apartments discard their wastes in a collection container within their apartment complex and regular household residents discard their wastes in front of their home to be collected by garbage trucks. The discarded wastes are generally picked up between 3 a.m. and 5 a.m.

For recyclable waste, residents separate the recyclable waste into recyclable item disposal bins and it is collected regularly at a designated time.

With bulky waste such as home appliances and furniture, residents are required to discard the waste by attaching appropriate stickers and these stickers can be purchased from local administrative office or a hauler who collects bulky wastes.

For food wastes, apartment residents discard them in food waste-only container bins and regular household residents discard them in food waste-only bags. Discarded food wastes are collected by a hauler either everyday or every other day depending upon municipality's capability.



<Figure 1> Collection System for Recyclable Waste

## 2.7 Collection System for Recyclable Items

Separate procedural guideline is set for collecting and treating recyclable waste. Recyclable wastes are, in principle, collected free of charge. If a community or association brings in separated recyclable waste to recycling centers, it can be traded with other recycled goods or be compensated with monetary rewards.

### 1) Waste Separation

Apartments and other communal residential areas separate recyclable wastes into 5 types, while typical residential areas separate them into 2-3 types, mainly paper and other recyclable items. Communal areas are required to designate collection sites and place separate collection bins for recyclable items in their neighborhood. Residential areas, where placing collection bins are inconvenient, recyclable wastes are collected on a door-to-door basis.

### 2) Waste Collection

As mentioned above, recyclable wastes are

collected either by door-to-door, through collection bins or at designated areas on a certain date, or by face to face depending upon the characteristics of the neighborhood and local government's circumstances. When amount of recyclable waste increases, number of collection is adjusted. In communal areas, 5 types of separated recyclable waste are picked up as it is, and in residential areas, separated recyclables are collected in 2-3 types or in mixed status.

## 2.8 Preventing Illegal Dumping

In cases when designated VBWF bags are not used and wastes are disposed indiscriminately in inappropriate places (i.e remote hill areas) or illegally incinerated, a maximum fine of 1 million won (US\$ 910) is imposed on the violator. The education of the person and delayed collection of waste disposed are also enforcement tools. In order to monitor illegal behavior, members of local environmental group and citizens movement are designated as monitoring personnel for the enforcement work of illegal behavior. Supervision-specialists are also employed for longer period monitoring. Municipalities operate pollution report centers, too.



## 2.9 Recent Developments

### 1) Re-usable Bags

Even though free distribution of disposable vinyl bags at grocery stores has been restricted since 1999, about 15 billion sheets of vinyl bags are still being used. In order to further reduce the use of vinyl bags, re-usable VBWF bags were introduced in July 2002.

Re-usable VBWF bags can be purchased at the grocery stores to carry the purchased goods and later use it as regular VBWF bags when disposing garbage. The use of vinyl bag to carry purchased goods can thus be reduced. The re-usable VBWF bags are designed pleasantly with convenient hand straps for easy carrying.

### 2) Separate Collection for Disposable Vinyl Bags

Disposable vinyl bags are being used in excessive amounts and 5-15 sheets of vinyl bag are founded in a 20-liter size VBWF bag disposed by households. Since such over-use of vinyl bags harms stability of the landfill sites, a system has been established for separate collection of disposable vinyl bags. Vinyl bags are collected separately either for free of charge or for charge according to each community's circumstances.

### 3) Village-level VBWF system for Rural Areas

In rural areas, houses are scatterly located and thus burning or disposing waste without using the trash bags are often found. Village-level Volume-Based Waste Fee System was introduced in July 2002 to effectively deal with waste management and to prevent illegal behavior in rural areas. The main purpose of this system is to prevent illegal burning and dumping in rural areas where it is difficult to monitor.

In village-level VBWF system, the head of municipalities is required to install community waste collection bins for both recyclables and trash separately where residents bring their waste and the municipality conducts waste collection, transport and treatment duties. In order to prevent illegal dumping, supervisors for waste collection need to be designated and self-monitoring system should be operated. The waste fee is levied on the whole community and the payment is made through the village fund. Later, each household is

charged on an average rate.

Target village of this system are villages with less than 50 households; villages that are not currently part of the waste management district; and the ones which headman of Kun decides necessary excluding capital city of Kun. Currently, remote rural areas with less than 50 households are excluded from waste collection areas, however, efforts are made to introduce village-level VBWF system.

Agricultural waste vinyl, pesticide bottles, and recyclable items are separated from regular household waste, and agricultural machinery and waste oil are collected separately and transported to the nearest recycling centers.

### 4) Responsibility for Maintaining Cleanliness

Deserted garbage can be often found in vacant lots in urban areas after introduction of the Volume-based Waste Fee System. In order to prevent the piling-up or leaving of wastes in the neighborhoods of housing areas, responsibility for maintaining cleanliness was introduced in each city or town. Cases of piled up wastes left for a long period of time harm the atmosphere of a city, and ruin its sanitary conditions.

Under this scheme, mayor or the head of provincial and local government can issue an order to the owner of the land or premise to clean up deserted waste or incinerated (burnt) waste. If the order is not complied within a month of issuance, the owner of the land can be fined for an act of negligence.

This scheme was introduced through the Article 7 of the Waste Management Act in 1999. The Act emphasizes the need for cleanliness of buildings and lands and mandates necessary actions to be undertaken if cleanliness is not maintained.

After the enforcement of this scheme, many exemplary cases of improvement of vacant lots has been on the rise through such activities as growing of flowers or turning the vacant lot into a parking space.

### 5) Separate Collection of Food Waste

At the time of VBWF introduction in 1995, food waste was disposed with other solid wastes through VBWF bags. However, since most food waste is soggy, it creates foul odor, spawns a

great amount of leachate in landfills and decrease incineration efficiency. Since food wastes contain a high degree of organic matters and nutrients, one of the best solutions is to recycle them in order to obtain value from these organic resources. Now, food waste is separated in food waste-only collection bins or food waste-only bags and collected by municipalities or haulers. Starting in 2005, direct landfilling of food waste generated in urban areas will be completely banned.

Separate collection and recycling obligations for food waste has been enforced since 1997 mainly for large-scale food waste generators such as restaurants and group-meal facilities in the beginning. However, the system has now been expanded to small-scale generator and regular households.



## 6) Rewards for Reporting Illegal Waste Dumping

Anyone found to throw away garbage without using VBWF bags or illegally burning waste is imposed with maximum of 1 million won (US\$ 910) of negligence fine in accordance with the waste management law.

Since imposition of fines for unlawful activities has its limitations in effectively preventing such behaviors, the reward system for reporting unlawful activities was introduced in 2000

public parks, amusement parks, tourist resorts, mountain paths, stadiums and beaches do not generate waste on a regular basis, and for this reason, a system different from that of residential areas is needed.

If the entrance fee to the location does not include waste treatment cost, visitors are required to directly purchase VBWF bags and if the cost for waste treatment is included in the entrance fee, then VBWF bags can be handed out to visitors or have the garbage cleaned by the manager of the facility. In particular, for mountain paths and amusement parks, large waste container bins and recyclable item containers are installed in easily accessible areas.

In public areas where VBWF is not administered, mayors or heads of local governments can require the visitors to take back the garbage they have generated or, in an inevitable case, place collection containers for recyclable and regular waste at a convenient location where it is easily accessible.

## 8) Bio-degradable Bags

Use of biodegradable bags is recommended to reduce adverse environmental impacts of the non-degradable polyvinyl bag. It is also recommended to use biodegradable vinyl in various packaging materials to reduce quantity of non-degradable polyvinyl wastes. A program to discount tipping fee for landfill to the municipalities, which use biodegradable VBWF bags is under consideration in order to expand the use of biodegradable bags.

## 9) Incentives for Reducing Waste

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