07

Waste

E C O R E A

is a compound of the prefix "ECO", which suggests an ecologically sound and comfortable environment, and the name the of the nation, "KOREA"

Main Policy Framework

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(2) Waste Management and Reduction

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Key facts and trends

(1) Waste Generation

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Main Policy Framework

(1) Policy Direction of Resource Circulation

The waste policy of the Ministry of Environment of Korea, based on the principle of resource circulation, is aimed at minimizing untreated wastes in landfill and maximizing recycling by refraining from the single use and disposal of energy and resources to create a resource circulation society in which natural resources and energy are recirculated within the economic activity areas for as long as possible.

Under this policy, the first fundamental plan of resource circulation (2011-2015) was established in 2011 with the goal of realizing a zero-waste society by going beyond the quantitative level of resource circulation and shifting towards "upcycling" that upgrades the value of waste resources.

In addition, the ministry announced measures to promote the transition to a resource circulation society in September 2013, which include free pickup services for large-scale waste home appliances, securement of the collection, transportation and classification of recycling resources, expansion of waste to energy facilities, creation of a recycling market, etc. To that end, it plans to establish the "Act on Promotion of Transition toward a Resource Circulation Society."

<Table 7-1> Paradigm Shift of Waste Management Policy

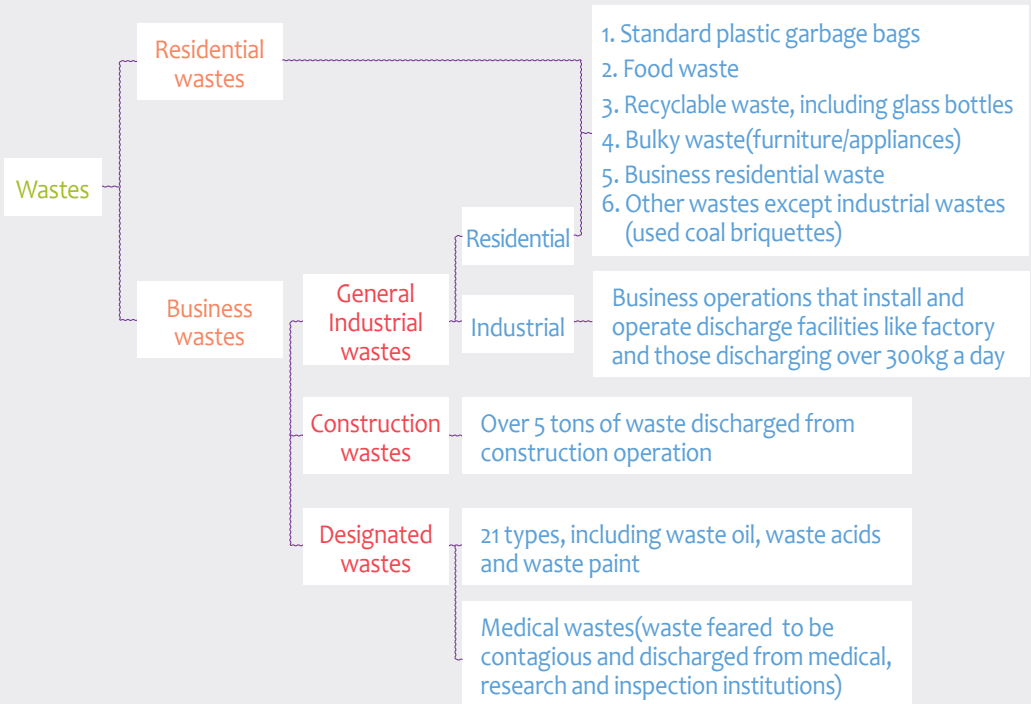
Category	Previous Policy Direction		New Policy Direction
Motivation	Worsened environmental pollution due to waste		Climate change, Raw material and energy exhaustion
Objective	Create clean living conditions	➡	Construct a resource circulation society
Implementation strategy	Reduction → Recycling → Treatment		Efficient Production/Consumption → Material recycling → Energy harvesting → Advancing treatment
Main Tasks	Volume-based waste fee system, EPR, and building the treatment facilities	➡	Resource recyclability evaluation, Recycled product quality certification, Waste-to-Energy, Merger of treatment district
Core concept	'Waste'		'Resource (Circulation/Natural)'

(2) Waste Management and Reduction

Legal Classification of Wastes

The Wastes Control Act largely classifies wastes into "residential wastes" and "business wastes" depending on the source of generation. Business wastes are divided into "general industrial waste", "construction waste", and "designated waste" according to hazardousness. Examples of designated wastes include 21 wastes with potential hazards to the human body, including waste oil, waste acids and medical waste, and construction waste takes up a considerable portion of industrial wastes.

Fig. 7-1 Legal Classfication of Wastes



Volume-based Waste Fee System

The Volume-based Waste Disposal System is a policy, in accordance with the polluter pays principle, to fundamentally reduce waste generation and facilitate separation and discharge of recyclable materials by imposing waste fees in proportion to the amount of residential wastes one generates (except recyclable wastes). Under this program, wastes are required to be discharged by using designated standard plastic garbage bags or putting on labels marking wastes as bulky waste, and the charges are collected by selling volume-rate garbage bags and labels marking wastes. In the case of discharging recyclable materials, they are collected free of charge regardless of the amount.

The Volume-based Waste Disposal System applies to residential waste discharged from households and business operations, and was recently expanded to cover food waste.[3] This program, launched in January 1995, is considered to have significantly decreased the amount of residential waste. With this, the daily generated amount of residential waste per person decreased from 1.3kg in 1994 to 1.0kg since 1995 after the implementation of the program.

Waste Charging System

The Waste Charging System is designed to control the generation of wastes and prevent waste of resources by charging the manufacturers or importers, under the polluter pays principle, the cost for disposing of products, materials and containers that include poison or harmful substances, or are difficult to reuse and have the potential to create problems in waste management.

The collected waste charges revert to the Environmental Improvement Special Account and are used to fund studies on waste reduction and reuse, as well as the development of related technology, supporting projects for installing waste disposal facilities and reusing waste, funding local governments for retrieving and reusing waste, and purchasing and stocking up on reusable resources.

The items charged as of 2013 are pesticide and poisonous substance containers, anti-freeze,

3) For more information, see **Current Policy Focus** (2) Volume-based Food Waste Fee System

chewing gum, disposable diapers, cigarettes, and plastics. As for plastics, the disposal cost will be levied on the end product rather than the raw material itself, considering the varying reuse rates.

Business Waste Reduction Program

The Reduction of Industrial Waste program is concerned with reducing environmental hazards by minimizing the amount of waste disposed of through the control of their generation and expansion of recycling in order to encourage the voluntary efforts of businesses to reduce harmful waste.

This program was introduced in December 1996, and four types of business operations were added to target businesses subject to mandatory waste reduction in 2014. Currently, 2,312 businesses from 18 types of business operations that are considered to generate large amounts of waste are designated for the reduction program and encouraged to voluntarily make improvements on waste reduction. An analysis and evaluation of waste reduction records in 2012 shows that production output increased by 6.9% compared to the previous year, while the amount of waste generated increased by 5.4% compared to the previous year. This result indicates that the voluntary efforts of businesses, including eco-friendly process improvement (1.7 million tons) and eco-friendly material use led to the prevention of waste generation.

<Table 7-2 > Business Waste Reduction Results

Classification		2012 Performance
◦ Number of Target Businesses		1,538
◦ Production Output (kton)		780,938
◦ Prevented Amount of Waste Generation (kton)		340
◦ Waste Generation (kton)		39,703
- Generated Amount per ton of output (kg/ton)*		50.8
Treatment Method	- Recycling (kton, %)	36,582 (92.1%)
	- Incineration, Landfill, etc. (kton, %)	3,120 (7.9%)

* Generated Amount per ton of output : The amount of waste (kg) generated from the production of 1 ton of waste-generating products

In 2005, an online waste reduction information system (www.allbaro.or.kr) was created to provide information on waste reduction policy direction, model cases and reduction methods, and a reward program for businesses with outstanding performance in reducing waste generation, as well as a presentation program for model businesses with outstanding performance in reducing waste generation, have been in place.

(3) Waste Recycling

Extended Producer Responsibility (EPR)

Extended Producer Responsibility was introduced to promote the reduction, reuse and recycling of waste by encouraging manufacturers to consider the environment through the whole process of product design, manufacturing, distribution, consumption and disposal.

Prior to introducing the EPR, the Wastes Deposit Program had been implemented since 1992 as a way to strengthen the role of manufacturers regarding recycling. The Wastes Deposit Program allowed manufacturers to deposit a cost in proportion to their production output and retrieve it in the amount in proportion to their records in reuse. It was designed to encourage businesses to make effort to recycle by offering financial incentives, but the system faced criticism because companies simply paid the charge and did not make actual reuse efforts.

Under these circumstances, the Waste Deposit Program was abolished and EPR was introduced to ensure the practical efforts of businesses. After a preparatory period that began with seven items, including electronic products, between 2000 and 2002 with a voluntary agreement between the government and industry, the full-fledged Extended Producer Responsibility system was introduced in 2003. The total amount of recycling has grown from 938,000 tons in 2002 to 1,519,000 tons in 2012, an increase of about 62%, which implies quantitative growth in the recycling sector.

At the time of the initial operation of EPR in 2003, the target items were limited to products and packaging containers such as paper packs, glass bottles, metal cans, synthetic resin packaging,

batteries, tires, lubricants and electronic products, but the list of applicable items has been consistently increased to include the items shown in <Table 7-3> [4].

<Table 7-3> EPR Target Items

Products	Tires, Lubricants, Batteries (six types, including mercury batteries), Fluorescent lamps, Electronics and Electric Products (27 types, including TVs and computers), Aquaculture Styrofoam buoys
Packaging containers	Metal cans, Glass bottles, Paper packs, Synthetic resin packaging used for Food and Beverages, Agricultural, Fisheries, and Livestock products, Detergents, Medicines and Cosmetics

If manufacturers subject to mandatory recycling fail to meet their targets, they should pay fees. The fees are imposed on less than 130% of the actual recycling cost per item, and vary depending on the recycling performance rate. If manufacturers exceed their targets, the amounts that surpassed the targets can be used for 2 years.

Since 2008, the long-term recycling targets for 5 years have been announced to help manufacturers establish recycling plans from a long-term perspective.

In addition, electric and electronic products such as TVs, refrigerators, washing machines, computers and mobile phones are designated as items subject to mandatory recovery through retail stores. In other words, the retailers of electronic and electrical products should collect waste electric and electrical products and the packaging of new products free of charge when purchasers ask them to do so after they purchase new products.

Program for Ensuring Environmentality in Electrical & Electronic Products and Automobiles

Eco-Assurance System (ECOAS) for Electrical & Electronic Products and Automobiles is concerned with creating a resource circulation system encompassing the whole process from

4) According to the Eco-Assurance System (ECOAS), which began after the Act on Resource Circulation of Electrical and Electronic Equipment and Vehicles was implemented, not only recycling of electrical and electronic goods, but also their use of harmful substances are controlled. For more information, see the Program for Ensuring Environmentality in Electrical & Electronic Products and Automobiles in the following chapter.

design and production to disuse in order to control the use of harmful substances and thus facilitate recycling.

To support this program, Korea implemented the Act on the Resource Circulation of Electrical and Electronic Products and Vehicles in April 2007. Prior to the enactment of the law, the government implemented a guideline on examination of preliminary recycling of electrical and electronic products and vehicles and restriction of their use of harmful substances. However, their feasibility was not satisfactory, and the follow-up management at the disposal stage was conducted through EPR, but was limited to electrical and electronic products.

The main contents of the Act on the Resource Circulation of Electrical and Electronic Products and Vehicles are as follows. First, businesses are encouraged to use eco-friendly and easy-to-recycle raw materials in the production stage and are made to assess and evaluate their compliance with standards on the inclusion of harmful substances.

Second, every manufacturer or importer of electrical and electronic products and every manufacturer or importer of vehicles must provide people who are engaged in the recycling business with information about recycling, including the composition of materials, contents of harmful substances and dismantling methods, to help those persons pursue their recycling businesses.

Third, the law clarifies the roles of interest groups related to the recycling of end-of-life vehicles. Manufacturers or importers of vehicles should make efforts to develop and distribute recycling technology and provide financial and technical assistance. Persons who run a business of dismantling vehicles and persons who run a business of recycling residual scrap should recycle resources from end-of-life vehicles as much as possible, and recycling methods and standards for end-of-life vehicles were established to promote proper recycling.

Fourth, every automotive dismantler should separately collect and store substances that affect the climate and ecosystem such as freon gas. Every vehicle scrap recycler must separately discharge residual scrap generated from end-of-life vehicles after collecting metals, and the expenses needed for treatment and recycling is deducted from the price of end-of-life vehicles.

Food Waste Recycling

Although the Ministry of Environment put a priority on reducing the generation of food waste as its basic direction of food waste management policy, it is also actively promoting recycling of food waste inevitably generated as organic resources despite the reduction efforts. Food waste can be turned into valuable resources such as feed and fertilizer since they contain organic substances and nutritive components.

<Table 7-4> Food Waste Generation and Treatment

(Unit: Ton/day)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Generation	11,464	12,977	13,372	14,452	15,142	14,118	13,671	13,537	13,209
Generation per person (kg/person/day)	0.24	0.27	0.28	0.29	0.30	0.28	0.27	0.26	0.26
Landfill	1,607 (14.0)	356 (2.7%)	261 (2.0%)	451 (3.1%)	565 (3.7%)	281 (2.0%)	194 (1.4%)	167 (1.2)	153 (1.1)
Incineration	541 (4.7%)	516 (4.0%)	507 (3.8%)	674 (4.7%)	867 (5.7%)	459 (3.3%)	422 (3.1%)	465 (3.4)	381 (2.9)
Recycling	9,316 (81.3%)	12,104 (93.3%)	12,603 (94.2%)	13,327 (92.2%)	13,710 (90.5%)	13,378 (94.7%)	13,055 (95.5%)	12,905 (95.3)	12,675 (96.0)

To that end, the developer of a housing and tourist complex was made to mandatorily install a facility to convert food wastes into resources in December 1997. According to the "Fundamental Plan on Food Waste Recycling" established in 1998, the reduction target and implementation measures are to reduce the total amount of generated food waste by more than 10% and recycle the total amount of food waste by more than 60% by 2002. In 2004, Comprehensive Measure for Reducing Food Wastes was established. As a result, 96% of the total amount of generated food waste (13,209 tons/day) is used as recycling materials, such as feed and compost, as of 2012.

As of the end of 2013, a total of 185.1 billion won has been used to fund the installation of public facilities to convert food wastes into resources, and vehicle purchases for 130 businesses and 926 billion won was loaned to a total of 2,227 private businesses from the Recycling Industry

Promotion Fund to assist related technology development and facility installation in the private sector.

Construction Waste Recycling Promotion

Construction waste has increased consistently, from around 53 million tons in 2003 to around 68 million tons in 2012, due to the requirements of the domestic construction industry, and it makes up more than half of the total amount of business waste.

The recycling rate of construction waste has increased continuously, to 97.3% in 2012, thanks to the government's recycling policy, and thus the landfill rate has been gradually decreasing. However, most of the construction waste is recycled at a low level, such as mounding and backfill, and the real recycling rate of high-value-added waste resources such as aggregates and asphalt remains at 32.3% due to negative perception and reluctance to use them. Under these circumstances, the government has been implementing various policies with an aim to increase the rate of recycling of resources with high added value to 45% by 2016.

<Table 7-5> Construction Waste Treatment Status (as of 2012)

Classification	Total	Landfill	Incineration	Recycling
Treated amount (ton/day)	186,627	4,118	1,016	181,493
Percentage	100.0%	2.2%	0.5%	97.2%

As for the proper treatment and recycling of construction waste, Ministry of Environment and Ministry of Land, Infrastructure and Transport has divided their roles and implemented them. The Ministry of Environment established the Construction Waste Recycling Promotion Act, which was put into effect in January 2005, to provide the legal ground to treat construction waste in an eco-friendly manner and recycle waste to create high-value resources.

According to the law, recycled aggregates should be mandatorily used for the construction of roads, industrial complexes and environmental infrastructure. In 2013, the revision of the

enforcement ordinance and regulations specified the treatment methods for construction waste. Based on the revision, the asphalt concrete waste used for simple mounding and backfill should be separately discharged and stored away from other construction waste, and the recycling of asphalt concrete waste was restricted to road construction.

To guarantee the quality of recycled aggregates, the government introduced a quality certification system for recycled aggregates in January 2007 and implemented quality standards for recycled aggregate products by use in 2012.

Moreover, information related to the transfer of construction waste through the process of discharge, collection and transportation, and treatment should be inserted into an electronic information treatment program to manage construction waste in a transparent and effective way. Also, a construction waste information management system has been in place that provides information related to the production status, quality, demand and supply of recycled aggregates to directly link manufacturers and consumers.

Exchange of Resources used by the Circulation

The Exchange of Resources used by the Circulation is an online marketplace between waste suppliers and waste consumers. This system allows waste suppliers to register information about types, properties, quantity and quality of wastes with the online exchange, and then waste consumers can use this information on the nearest business operations, prices, regions and quality to find and purchase optimal products. Starting from the second half of 2014, a distribution assistance service intermediating between businesses engaging in waste discharge and waste treatment, a GIS-based search function, and an electronic bidding system were additionally introduced to the system to dramatically activate the trade of high-value-added waste resources.

Fig. 7-2 Mission of the Exchange of Resources used by the Circulation

This program was initiated in 2012 as a pilot program using synthetic resin wastes, secondhand home appliances, furniture and baby products. It produced tangible results, with a total of 690,000 trades accomplished by the end of July 2014.

The government plans to strengthen support for this program, including expanding source of demand and creating new markets for waste resources, by activating the functions of the Exchange in preparation for strengthening various recycling-related policies in the future, including landfill and incineration charges and prohibition of direct disposal in landfills.

Fostering the Recycling Industry and Expanding Related Infrastructure

In an effort to foster the fledging domestic recycling industry, the government provides long-term, low-interest rate loan support for facility installation, commercialization of development technology, technology development, management stability and distribution and sales of recycling businesses. An analysis of loan support for small-scale waste recycling businesses shows a total of 1,064 billion won was loaned to 2,614 businesses from 1994 to 2013.

Meanwhile, as the recovery of recyclable resources significantly increased due to the positive results of the recycling policy, there is a growing need to expand infrastructure, including facilities for gathering and selecting recycling resources. To meet this requirement, the government has been implementing a project to substitute and convert the public recycling infrastructure of local

governments to modern facilities since 2000. As of 2013, a total of 147.4 billion won was used to fund 394 business operations for the installation and improvement of collection facilities (local governments shared 30% of the total expenses).

(4) Hazardous Waste Management

Allbaro System (Waste Management System)

The Waste Disposal Certification System, which was introduced in 1999 to track the transportation of hazardous wastes, was a system in which recording and transferring of document and reporting to relevant authorities was performed manually. Thus, it was difficult to achieve its intended goal since the program required excessive amounts of manpower, time and costs to figure out the moving routes of wastes by checking documents.

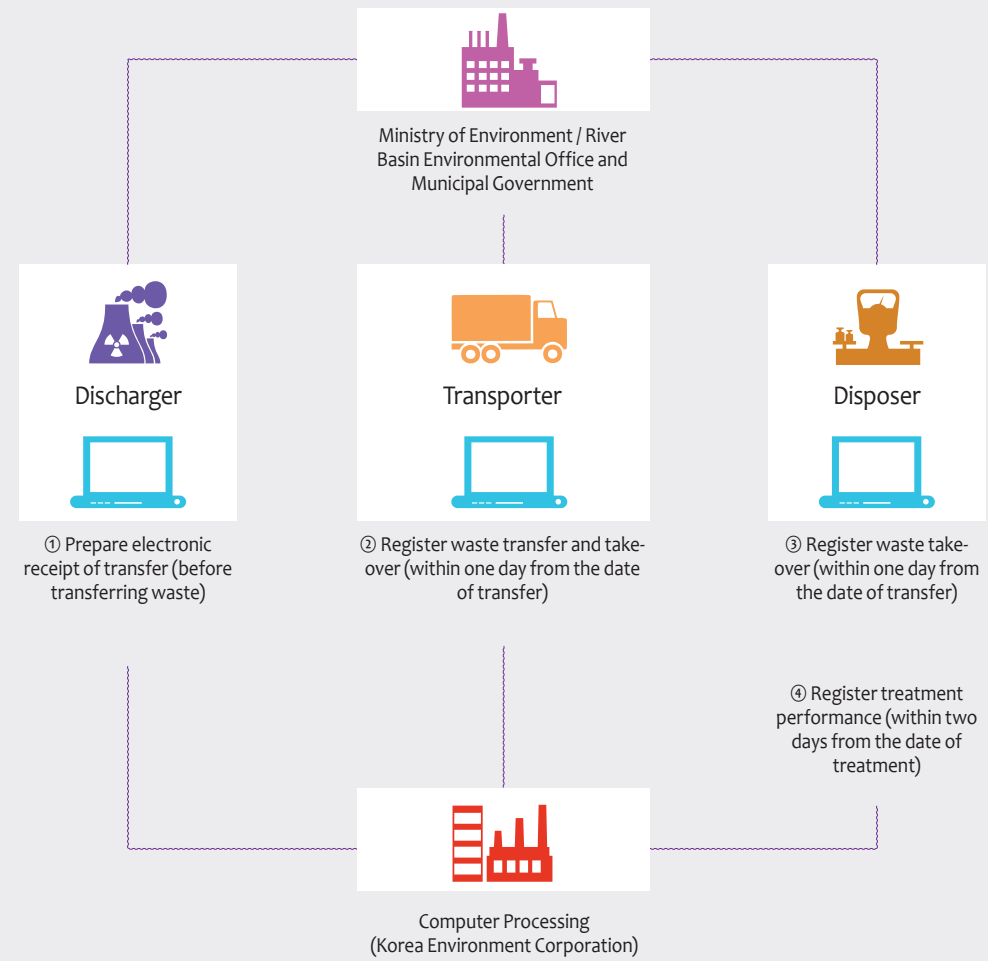
To resolve this problem, the Allbaro system (Waste Management System), which enables the reporting, confirming and record management on the Internet of the entire process of waste from discharge to final treatment, was introduced in September 2001. Following its trial operation, the system was put into operation in September 2002, serving businesses that discharge large amounts of designated waste and their contracted businesses related to the collection, transportation and treatment of waste.

The Allbaro system digitizes and processes the waste transfer certificates that circulate between waste producers, transport agents, processing agents, and administration, and enables a user to compare and analyze previously compiled agent license information and waste transfer data. A user can trace waste transfers, check waste processing stages and processing results at any time. Government administrators can oversee the entire process of waste management in real time, and ensure that waste is transferred in a legal and transparent manner to prevent illegal disposal.

Since the full-fledged operation of the system in September 2002, it has gradually expanded to cover industrial waste other than designated waste. As of the end of 2013, 340,000 businesses have

used this system, and more than 10 million electronic take-over documents are issued annually, which means that about 128 million tons of wastes, accounting for most of the waste generated from nationwide business operations, have been managed by the electronic information system.

Fig. 7-3 Scheme of the Allbaro System



Abandoned Waste Treatment

A lot of waste was left abandoned after failing to be properly treated by waste-related businesses that went bankrupt during the financial crisis in 1998. As of the end of 2011, 3,057,000 tons of abandoned waste was generated from a total of 970 businesses. Among this, about 96%, or 2,937,000 tons of waste, were treated through the polluter pays principle or administrative measures as of the end of 2011, and about 90,000 tons of abandoned waste from 16 businesses across the country remain untreated.

Against this background, on February 8, 1999, the government introduced the Abandoned Waste Performance Bond Guarantee System, which ensures the guarantee of disposal of abandoned waste by allowing waste treating businesses to choose either to join a mutual aide association or to take up a performance bond insurance policy. In the case of joining a mutual aid association, the association takes the responsibility to dispose of abandoned waste through mutual aid projects for its members, while in the case of purchasing the insurance the supervisory authority receives the insurance money to treat abandoned waste.

Since then, the government has made various efforts to improve the effectiveness of the system, including expanding the scope of businesses to be subject to the performance bond system. Recently, the costs for disposal of abandoned waste, which serve as a standard price to calculate the performance bond deposit for abandoned waste, were raised to ensure the efficient implementation of abandoned waste disposal, and the unit prices of for the disposal of different types of abandoned waste, which were revised in October, 2013.

Medical Waste Management

Medical waste requires strict management and safe treatment, as it contains disease-spreading viruses and bacteria that are highly infectious and have a high risk of secondary infections that are difficult to treat. Currently, 148,000 tons of medical wastes are generated yearly (as of 2012), and the amount is expected to continue to grow with the increasing elderly population, which buttresses the need to steadily push for a policy for an efficient safety management related to medical waste.

While the infectious characteristics of medical waste require strict management, their efficient management within a scope that reassures safety must not be disregarded. Thus, it has been necessary to create an efficient management system and alleviate the burden of the discharging party (e.g., hospitals), while reinforcing safety management from discharge to the treatment of medical waste.

To make improvements in such problematic aspects, the government has come to work to upgrade efficiency in the use of containers dedicated to medical waste within a scope that assures safety management, while moving to establish Radio Frequency Identification (RFID) that would ensure real-time computerized monitoring of the discharge, collection, transport, and disposal of medical waste. The RFID-applied tracking of waste became mandatory for the transfer of medical waste in August 2008.

In 2008, an improvement allowed a mixed storage reflecting the properties, source, and charateristics of medical waste so that treatment was facilitated to meet the demand from discharging parties and treatment businesses. In 2010, standards were liberalized to create dedicated containers in various sizes, while legal action was ensured against any person who produced, distributed, or used dedicated containers in an illegal manner. Furthermore, in 2013, the safety management of medical waste was intensified when specific disinfection standards and disinfection equipment for vehicles transferring medical waste were established.

Current Policy Focus

(1) Disposable Products and Over-packaged Products

Along with the rapid growth of the national economy and increased living standards, the use of disposables and ostentatiously over-packaged products has become common, causing a waste of resources, generating unnecessary waste and bringing about a negative impact on the environment.

Accordingly, the Ministry of Environment started to act in 1994 to control the use of disposables and over-packaged products in accordance with the Act on the Promotion of Saving and Recycling of Resources, and currently focuses on legal regulations and voluntary agreements as it main policies to handle these issues.

Legal Regulations

The current legal regulations against disposable products require businesses that use large amounts of such products to restrict their use or prohibit giving them out to customers for free. As seen in <Table 7-6>, regulation measures and targets are differentiated in consideration of the characteristics of the business type.

<Table 7-6> Regulations of Disposable Products

Business type	Requirement	Subject items
Restaurant, Food service	Restriction of use	- Disposable cups (synthetic resin, aluminum foil) - Disposable plates (paper, synthetic resin, aluminum foil) - Disposable bowls (paper, synthetic resin, aluminum foil) - Disposable chopsticks, toothpicks, forks, spoons, knives, tablecloths
Bathhouse	Prohibition on giving away	- Disposable razors, tooth brushes, toothpaste, shampoo and conditioner
Large retail stores, wholesale & retail	Prohibition on giving away	- Disposable plastic bags and shopping bags (except paper bags)
Food manufacturing & processing, on-the-spot food manufacturing & processing (limited to large-scale stores)	Restriction of use	- Disposable synthetic resin containers
Banking, Insurance & Securities	Restriction of use (Restriction of production & distribution)	- Disposable promotional materials

As for the legal regulations for product packaging, the government puts restrictions on packaging methods (a space ratio in product packaging of 10-35%, or less than two times of

packaging) to reduce unnecessary packaging materials, as well as on packaging materials by prohibiting the use of materials that are difficult to recycle, including PVC.

The ministry has reflected the social and cultural changes and development of technology related to recycling and packaging to adjust regulation targets and measures. In 2008, it exempted biodegradable resin products from the regulation on disposable products, abolished the disposable cup deposit program and report reward system on disposable products on account of an insufficient legal basis, and permitted the use of disposable paper cups and free paper bags for shoppers.

The ministry established the Guideline on the Restrictions of Use of Disposable Products in order to ensure that local governments could conduct systematic checks and inspections of target businesses, and implemented crackdowns on over-packaged products during traditional Korean holidays like Lunar New Year's Day and Chuseok, and school admission and graduation seasons.

Voluntary Agreement

Coffee shops and fast-food franchises are representative businesses that use large amounts of disposable products, including disposable cups. In October 2002, Ministry of Environment reached a voluntary agreement with 13 major coffee shops and fast-food chains in an effort to reduce the use of disposable products. The major contents of the agreement include a reduction of the use of disposable products, intensified collection and reuse of inevitably used disposable cups, and offering incentives to people with reusable cups. In 2013, the agreement was renewed by adding some clauses that included the setting up of quantitative reduction targets, press releases on inspection results, and offering instant cash discounts to people with reusable cups.

In 2011, the Ministry concluded a voluntary agreement with five megastores to reduce the use of disposable plastic bags and promote the use of shopping baskets, encouraging them to use alternative materials such as shopping baskets and volume-based garbage bags and packing containers instead of disposable plastic bags. Moreover, by entering a voluntary agreement in 2012 with two bakery franchises that were using a lot of disposable plastic bags, the ministry has been making efforts to eliminate the practice of providing products in plastic bags unnecessarily, and to use paper bags instead of disposable plastic bags.

As for product packaging, the Ministry reached an agreement in 2011 with large-scale distributors and civic groups based on the Farm Produce Green Packaging Safety Regulations to reduce the use of accessory packaging materials such as paper bands and ribbons. In accordance with this agreement, about 40% of the paper bands were removed from fruit gift baskets for the Chuseok holiday in 2012. Following this move, in September 2013, the ministry expanded the scope of the targets of the agreement to include livestock and marine products, as well as agricultural products, increased the number of participating businesses and concluded the "Primary Food Eco-friendly Packaging Voluntary Agreement," which strengthened the contents of the existing agreement, including the use of reusable packaging materials. Also, the ministry concluded an agreement with the cosmetics industry and is implementing a pilot project to reduce the packaging of cosmetics containers.

(2) Volume-based Food Waste Fee System

Recently, Ministry of Environment has been shifting its policy direction to restrict the generation of food waste and has implemented a volume-based food waste fee system that imposes fees in proportion to the amount of food waste generated. This program has been implemented nationwide by expanding targets to include multi-unit housing starting in 2013.

A volume-based fee system has been implemented for residential waste with an aim to reduce the amount of waste generated and promote recycling since 1994, but recycling products separately discharged and food waste have been excluded from imposing the fees charged in the proportion of the amount of waste generated. However, as the amount of food waste generated has been increasing since the direct landfill of food waste was banned in 2005, people's living standards have improved, and the number of one- or two-person households now accounts for 48% of the total households, there is an increasing need to reduce the amount of food waste generated. In 2012, the daily generated amount of food waste was about 13,209 tons, which makes up about 27% of the total amount of generated residential waste (48,990 tons/day).

Subsequently, the relevant ministries jointly adopted the "Comprehensive Measures for Food

Waste Reduction" in 2010 and are promoting various measures fit for the characteristics of food waste by the stage and source of generation. As part of the implementation measures, the volume-based food waste fee system was implemented.

The volume-based food waste fee system can be implemented by choosing one of three billing systems, such as a designated standard bag system, RFID system, and a chip or sticker system. The standard bag system is one in which a discharger buys a standard plastic bag to dispose of food waste. The fees are collected in proportion to the amount of food waste through the cost of purchasing the bags. The chip or sticker system requires a discharger to buy a payment chip or sticker and attach it to a collection container to be picked up. The RFID system allows the information on a discharge to be checked through an electronic tag, and fees are charged according to the waste volume. Since the RFID system is the most suitable option for the objective of a volume-based fee system, the Ministry of Environment recommends this system.

As of June 2014, 142 out of 145 local governments are participating in the Volume-based Wastes Disposal System. In particular, the system was improved by correcting inconvenient details that appeared from conducting a trial project using an RFID system between 2010 and 2011. Based on these results, the RFID system has been expanding in earnest since 2012.

Fig. 7-4 Implementation Types of Volume-based Food Waste Fee System

Payment Chip	RFID	Standard Bag
		
- Suncheon in Jeollanam-do -	- Guri in Gyeonggi-do -	- Jongno in Seoul -

※ RFID-based Food Waste Fee System : Information on food waste(discharger and amount) is collected via an RFID chip and fees are charged in accordance with waste weights.

(3) Waste Electrical & Electronic Product Recycling Target Management System

The Waste Electrical & Electronic Product Recycling Target Management System is intended to require manufacturers to meet certain recycling amounts by setting a per capita recycling target rate. As it has become difficult to set clear classification standards for each item in the electrical and electronic product markets and to make remarkable improvements in recycling through the current item-based recycling measure, this system was introduced in January 2014.

The recycling target is a concept similar to the mandatory amount of recycling imposed on manufacturers in the existing EPR system, but it was changed from a method to set a mandatory recycling rate by item to a method to set a per capita target rate (kg/person) by product group. Under the EPR system, the mandatory recycling rates of individual manufacturers are calculated by applying market share rates to mandatory recycling rates by item, while under the Recycling Target Management System, the per capita recycling target rate is converted to the total amount in consideration of the population number, and the mandatory recycling target rate is set according to the market share of each manufacturer.

The Per Capita Waste Electrical & Electronic Product Recycling Target Rate announced in January 2014 was set at 3.9kg/capita in 2014 and 6.0kg/capita in 2018. Meanwhile, the number of target items increased from the existing 10 to 27, and these items are classified into five groups: large-scale equipment, telecommunication devices, medium-size equipment, small-size equipment and cellular phones. The government plans to establish a small- and medium-sized home appliance collection system in consideration of the discharging characteristics, weights and collection conditions of small- and medium-sized home appliances.

(4) Free Collection for Large-scale Household Appliances Waste

The Free Collection Service for Large-scale Household Appliances Waste is a system in which a person can reserve to dispose of a bulky home appliance such as a TV, refrigerator, washing machine, etc., using the Internet or via a call center, and then a task force team visits the household to collect the item free of charge.

In the previous system, residents were required to purchase a discharge sticker (between 3,000 won and 15,000 won) from the municipal government, attach the stick to the waste home appliance and put it outside their house to be collected. Moreover, as the collected items failed to be delivered to recycling centers, and some core parts containing rare metals were illegally collected to be sold or exported, such problems caused severe environmental pollution and resource outflows. A survey showed that less than 5% of the collected waste home appliances were transferred to recycling centers in their original state with the previous system.

Under such circumstances, the Ministry of Environment initiated a free pick-up service for waste home appliances in Seoul as a pilot project in June 2012, and five metropolitan cities and Gyeonggi Province participated in the program in May 2013. A total of 162,000 units of waste home appliances were collected through the program in 2013. Compared to the collection performance results in 2012 under the previous system, collections in 2013 increased significantly, 1.5 to 6 times by each local government. If the program succeeds, it is expected to greatly contribute to achieving the national recycling target for electrical and electronic products. In addition, as the recovery rate of appliances in their original forms improved remarkably, from below 5% to over 95%, the program is expected to contribute to the circulation of rare metals. The ministry plans to gradually expand the free pick-up service for waste electrical and electronic products nationwide starting in 2014.

(5) Waste-to-Energy

Korea depends on imports for 97% of its energy needs. Therefore, it is imperative that the country comes up with methods for extending the production and distribution of new and renewable energy. As of 2012, the ratio of total domestic primary energy to new and renewable energy was a mere 3.18%, but the government plans to increase the portion of new and renewable energy to 20% by 2050. The remarkable fact is that currently, over 67% of new and renewable energy is produced from waste, and its production cost is cheaper at 10% of solar power and 66% of wind power. Thus, energy production using waste has emerged as the method that can realize new and renewable energy in the most effective way at an early stage.

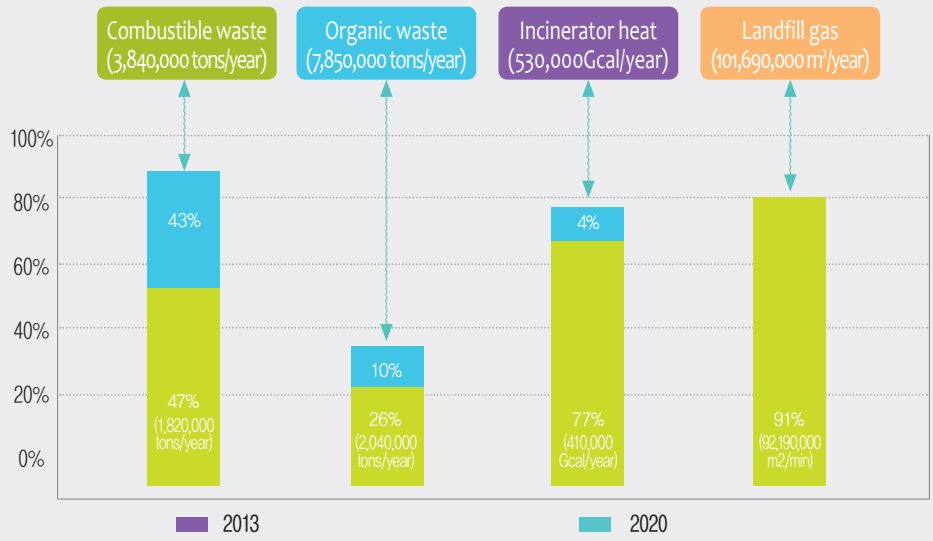
The total production of Korea's new and renewable energy in 2012 was 8,850,000 TOE[5]. Among this, the production of renewable energy converted from waste[6] was 3,220,000 TOE, which accounts for 1.2% of primary energy and 36.4% of new and renewable energy. The largest amount of energy was collected from residual heat from waste incineration facilities or landfill gas. Thus, the government needs to promote a more active waste-to-energy policy to expand its programs to include the production of Solid Refuse Fuel (SRF) using combustible waste and establishment of SRF power plants, and electricity production and upgrading facilities using biogas from organic waste.

The Ministry of Environment disclosed its Measures for Waste Resource and Biomass Energy in October 2008 and an implementation plan for the same measures in July 2009. According to the measures, the amounts of combustible waste and organic waste are 3,840,000 tons/year and 7,850,000 tons/year, respectively. Only 1.5% (58,000 tons/year) of combustible waste and 2% (160,000 tons/year) of organic waste are used as sources of energy. Against this background, the ministry is pushing ahead with relevant measures to increase the percentages of recycled inflammable and organic waste to 90% (3,450,000 tons/year) and 36% (2,830,000 tons/year), respectively, by 2020.

5) TOE (Tonnage of Oil Equivalent)

6) Waste gas excluded, biogas and landfill gas included.

Fig. 7-5 Waste-to-Energy Goals



Expansion of Waste-to-Energy Facilities

Since 2007, the government has gradually increased the budget to offer subsidies to waste-to-energy facilities, and is currently providing about 105.3 billion won in financial aid to such facilities in local governments across the country in 2014.

As a result, there are currently nine SRF facilities and boilers in operation, and 12 such facilities are being built as of June 2014. Also, a total of 10 facilities for converting organic waste to biogas are in operation across the country, including the Seoul Metropolitan Landfill Site and in the Dongdaemun District of Seoul, and seven facilities of the same kind are being designed or are under construction in major cities, including Daejeon and Jeonju.

Institutions for Waste-to-Energy

To facilitate the waste-to-energy measures, institutional improvement and statute revision are underway. First, as the ocean dumping of organic wastes was banned in 2012, a legal amendment

was made to ensure sewage sludge that was usually dumped into the sea could be used as fuel at coal-fired power plant. Also, the raw materials and manufacturing methods for solid refuse fuels became diversified through the revision of relevant laws to facilitate measures to convert combustible waste to solid fuel. Moreover, the SRF Product Information Management System (www.SRF-info.or.kr) has been operating since the end of 2010 to promote information exchanges between SRF manufacturers and consumers.

Eco-friendly Energy Town

Starting in 2014, the Ministry is actively pursuing a project to create Eco-friendly Energy Towns, which are designed to return profits to the residents by combining the production of new and renewable energy such as waste energy and solar photovoltaic energy. The ministry developed a project model aimed at improving the welfare and income of local residents by using waste resources such as food waste, and livestock manure and biomass to produce energy, including heat and electricity, or by providing or selling the gas and heat generated from landfills or incineration facilities to the surrounding areas, and is conducting a pilot project in Hongcheon-gun, Gangwon-do. Also, it plans to establish three Eco-friendly Energy Towns each year in the future.

Key facts and trends

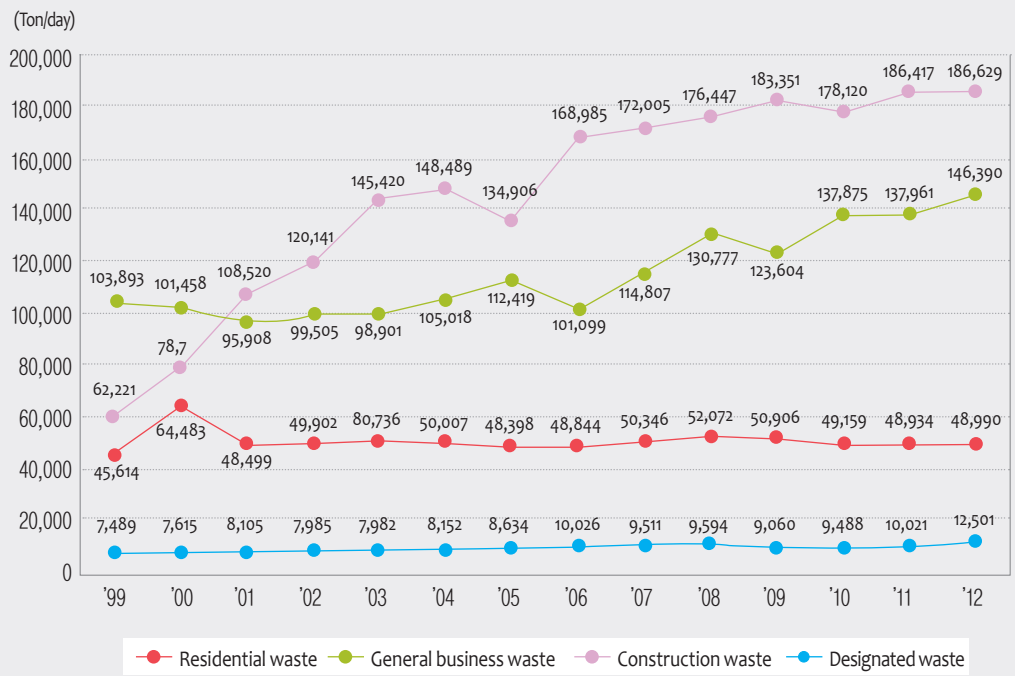
(1) Waste Generation

The ministry has been conducting surveys on waste generation status by source and type, and waste treatment status by subject and method annually, and is conducting a National Waste Statistics Survey every 5 years.

As for residential waste, the amount of waste generated per person has decreased from 1.3kg per day in 1994 to 1.0kg per day since the implementation the Volume-Based Waste Fee System. In 2012, the per capita amount of residential waste generation was 0.95kg per day. The reduction of the amount of residential waste generation can be attributable to the implementation of the volume-based waste fee system and the separate discharge policy for recycling materials and food waste.

On the other hand, the amount of industrial waste is on the rise. In particular, the amount of construction waste generated increased significantly between the late 1990s and the late 2000s on the back of the booming construction industry, but the trend is slowing due to the downturn of the industry since 2011. In addition, the amounts of general industrial waste and designated waste are consistently increasing due to the increase in industrial production.

Fig. 7-6 Residential and Business Waste Generation Trend



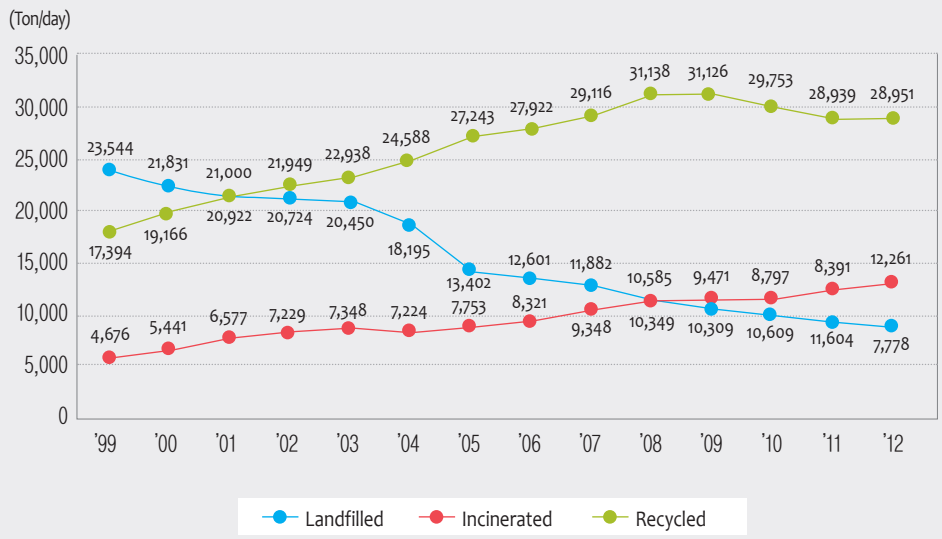
(2) Waste Treatment

With regard to treatment methods for waste, including residential and business wastes, 10.3% of waste was buried, 6.3% incinerated, 82.4% recycled and 1.0% discharged into the sea. Although the percentages of waste treated by incineration or recycled have been increasing annually, the rates of waste treated by landfill and ocean dumping have been decreasing. In particular, the reduction of waste discharged into the sea indicates that the ocean dumping of sewage sludge, food waste leachates, and livestock wastewater was banned in 2012-2013 as the 1996 protocol to the London Convention[7] took effect, and the treatment methods for these types of waste are being changed to incineration or recycling.

When considering the trend of residential waste treatment between 1999 and 2012, seen in <Figure 7-7>, the percentage of waste that is landfilled has steadily decreased, whereas the percentages of waste incinerated or recycled have increased. These results show that waste treatment measures are shifting from a simple landfill-based treatment to a resource circulation type, creating a virtuous circle of waste resources on the back of the volume-based waste fee system, promoting recycling and waste-to-energy efforts, etc. Meanwhile, the percentage of recycled waste has been decreasing since 2010, which implies waste that was simply recycled in the past is being converted into energy in accordance with the waste-to-energy policy.

7) London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972)

Fig. 7-7 Residential Waste Treatment



Likewise, the percentage of landfilled business waste is generally decreasing, whereas the percentage of recycled business waste is significantly increasing. The percentage of recycling of business waste is very high, at 82.4%. This is because construction waste, which has been almost entirely recycled, makes up a high percentage of the total amount of business waste generated, but the percentages of recycling of general business waste and designated waste are generally increasing.

By type of treatment, as of 2012, 97.3% of construction waste and 76.5% of business waste were recycled, 14.9% of them were landfilled, 6.5% incinerated, and 2.1% discharged into the sea, while 54.4% of designated waste was recycled, 16.4% incinerated, 23.0% landfilled and 6.2% treated by other measures (storage).

Fig. 7-8 Business Waste Treatment