Waste Management

1. Prevention and minimization and environmentally sound management of hazardous wastes

1.1 Waste Policy and Implementation Direction

In order to quickly respond to the changes in the policy circumstances caused by climate change and the exhaustion of raw material and fossil fuel, the government has adopted a new waste policy direction, which goes beyond preventing pollution and moves towards the construction of a sustainable resource recycling society, by managing waste as a recyclable resource and improving resource productivity.

The policy structure has been modified as well, from one that was focused on reduction, recycling, treatment and disposal, to one that is oriented toward recycling, energy harvesting, and the improvement of treatment and disposal methods.

< Paradigm Shift in Waste Management Policy >

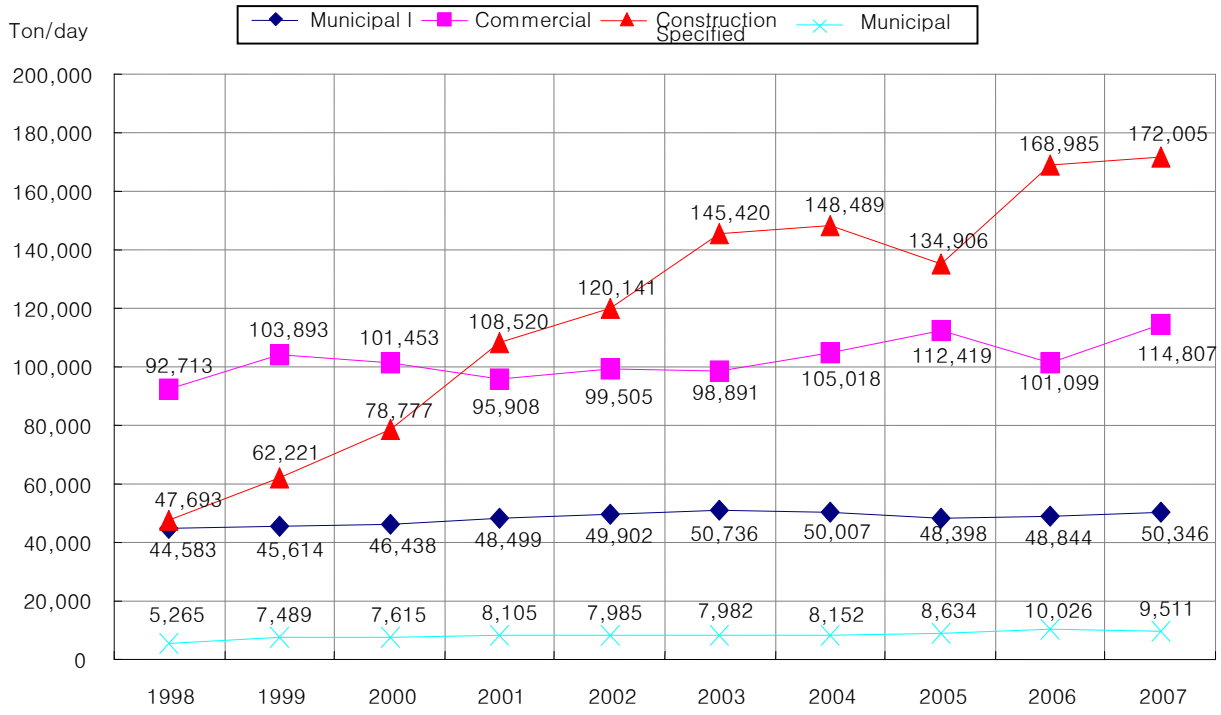
	Previous Policy Direction		**New Policy Direction**
Policy Circumstances	**Worsening Pollution due to Waste**		**Climate Change, Raw Material and Fossil Fuel Exhaustion**
Objective	**Create Clean Living Conditions**	⇒	**Construct a Resource Recycling Society**
Implementation Strategy	Reduction → Recycling → Treatment and Disposal	⇒	Effective Production/Consumption → Material Recycling → Energy Harvesting → Advancing Treatment and Disposal
Main Task	Volume-Rate Garbage Collection System,Extended Producer Responsibility Policy and Treatment Facilities	⇒	Resource recyclability Evaluation, Recycled Product Quality Certification, Waste-to Energy, Large-Scale Treatment
Core Concept	**“Waste”**	⇒	**“Resource(Recyclable / Natural)”**

1.2 Waste Generation Status

In accordance with the "Wastes Control Act", which was created to gather the necessary basis data for the establishment of waste management policies, current information on waste generation and treatment is collected and regularly updated, including the amounts of waste generated by type, regional distributions, and changes in disposal patterns. A "National Waste Statistics Survey" is conducted every 5 years, and a "National Waste Generation and Treatment" and a "National Designated Waste Generation and Treatment" are conducted annually.

The total amount of waste generated has gradually increased, but municipal solid waste disposed per person has decreased from 1.3kg per day in 1994 to 1.02kg per day in 2007. In particular, the amount of landfill and incinerated wastes has greatly decreased since 1995 due to the continuous increase in recycling caused by the implementation the Volume-Based Waste Fee System. However, the amount of construction waste has increased annually.

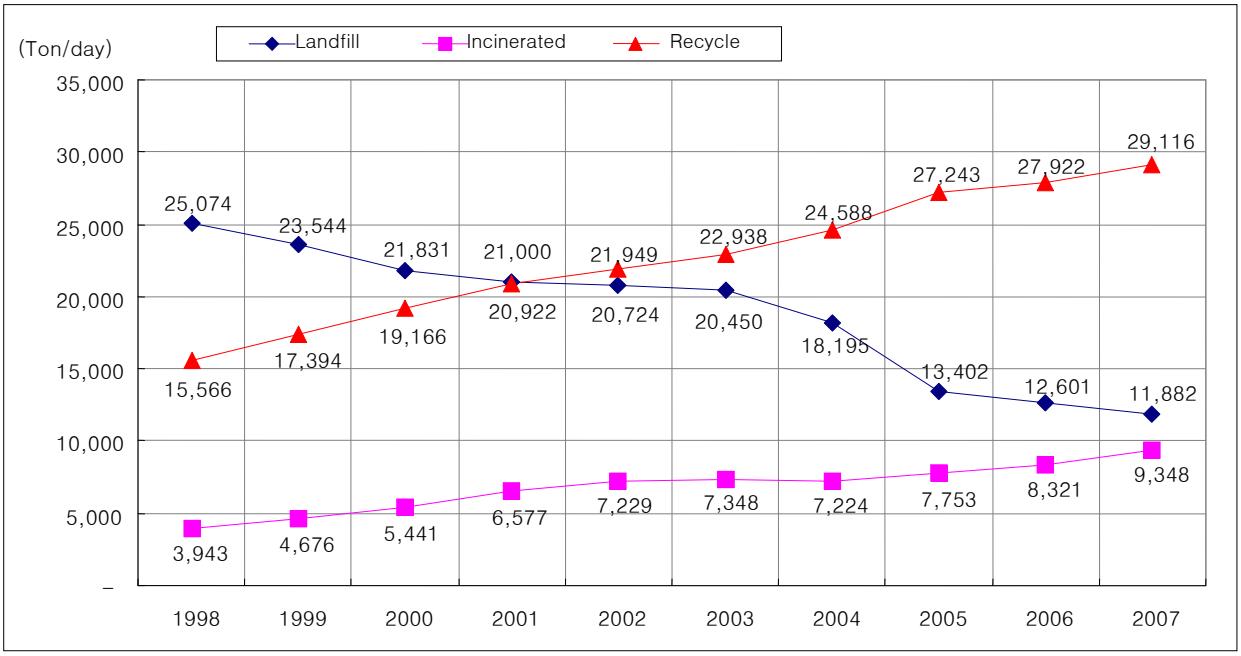
< Current Waste Generation >



1.3 Waste Treatment

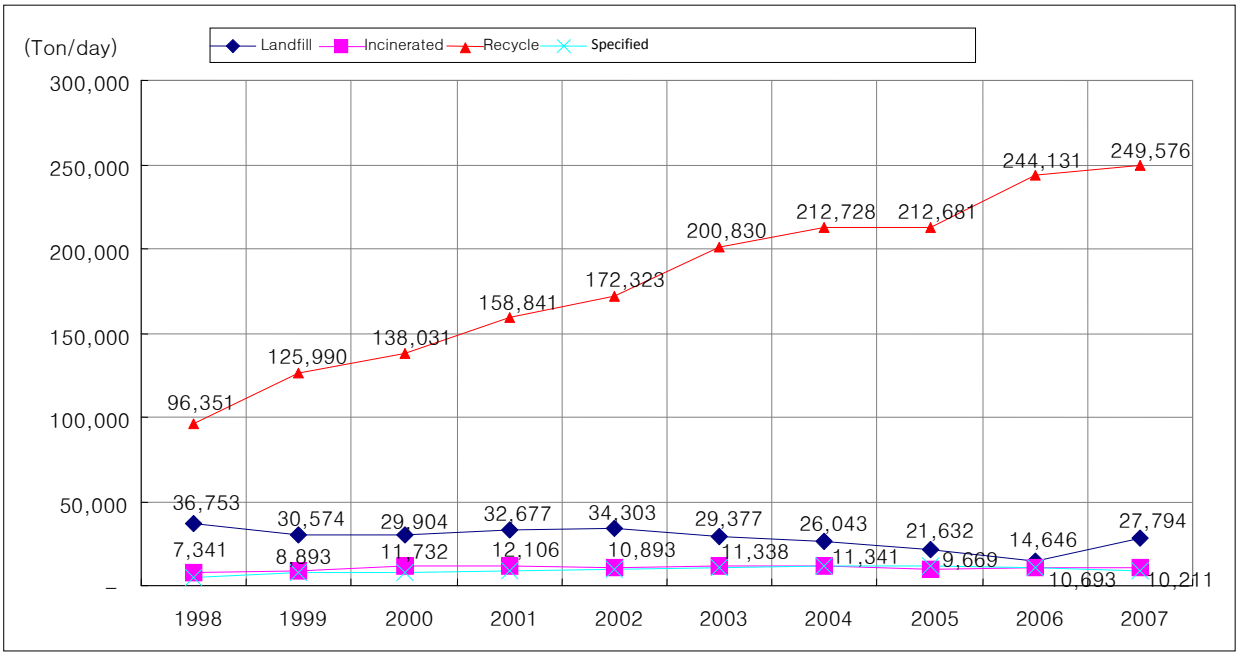
Looking at municipal solid waste, the recycling rate has increased and the percentage that is land filled has decreased, while the percentage incinerated has also increased. In 1995, 72.3% of municipal solid wastes were land filled and 23.7% were recycled, whereas in 2007, 57.8% were recycled and 23.6% were land filled.

< *Municipal Solid Waste Treatment* >



Commercial waste has demonstrated a similar pattern to municipal solid waste. The percentage of commercial waste that is land filled has decreased, whereas the percentage recycled has steadily increased, reaching 84.2% in 2007.

< *Commercial Waste Treatment* >



2. Transferring Expertise and Environmentally Appropriate Technology Related to Cleaner Technology and Low-waste Product Production

2.1 Programs for Technological Development

The government is implementing the "Clean Industry Original Technology Development Project," which prohibits the use of hazardous materials and promotes the reduction of the pollution generated by industrial activity. In addition, it supports the "Resource Recycling and Industrial Energy Technology Development Project," which aims to reduce resource consumption before production, and effectively recycle previously-used resources.

In 2008, 26.7 billion Korean won in government aid was spent on the development of clearer production technology. The government has also sponsored more than 140 fundamental industry environmental and original technology development projects to foster the production of E2 (ecological and economical) products and the development of non-polluting production technology, resource recovery technology, and alternative technology. As a result, reductions in commercial waste and ecological and economical efficiency have been continuously improved.

In 2008, the government gave 30.26 billion Korean won (Ministry of Knowledge Economy, 20.46 billion; Ministry of Education, Science and Technology and Ministry of Environment, 9.8 billion) to support the development of technologies

for efficient resource recycling. As a result, resource consumption has been greatly reduced, and resources already used once are efficiently being recycled.

The Korean government has drafted a technology development implementation strategy, and has adopted yearly development plans to substitute for or reduce the use of rare metals in electronic appliances and automobile manufacturing. By establishing a roadmap for the substitution and reduction of the rare metals used in automobile and electronic appliance manufacturing, the government has created a means to improve the nation's technological development efficiency. Furthermore, by deriving RFP (Request for Proposals) and implementation plans concerning substitution and reduction technologies for indium, transparent electrode, and platinum, it has proposed a systematic solution for rare metal substitution. In the future, the government will continuously support the implementation plans for the revitalization of the rare metals industry, as well the establishment of a resource management system at the state level that overcomes resource and environment problems.

Moreover, we have devised a plan at the state level, such as the formation of a taskforce team, to prepare a plan to revitalize recycling and recollect metal wastes for green growth.

Since 2005, the government has been promoting a remanufacturing project to recover and reuse resources in a more efficient manner. As a result, 4 products were examined, the standards for alternator and starter motor were set, and one product was ultimately confirmed as remanufactured.

An eco-industrial park spreads the clean production individually operated by businesses to an entire industrial park. Although businesses can independently practice clean production, such implementation has limitations. Furthermore, if businesses cooperate with their local communities, more examples of clean production can be achieved. Successful examples of eco-industrial parks can be observed in many different parts of the world. Since the project research for the construction of an eco-industrial park was conducted in 2003, the Ministry of Knowledge Economy has been running an eco-industrial park construction pilot project in 5 industrial parks (Yeosu, Pohwang, Sihwa, Banwol, Mipo, Onsan, and Cheongju) since 2005. In 2009, a 2-step project will be conducted in 2 additional industrial parks. For nationwide project promotion, the 'Act on the Promotion of the Transition toward an Environment-Friendly Industrial Structure' established an implementation basis for the eco-industrial park projects in 2005.

2.2 Education, Training, Raising Awareness, and Capacity Building

Since 2000, elementary and intermediate level education on CP methodology has been provided online for field workers of small and middle-sized businesses, in addition to a 12-week course on clean production and eco-management for the CEOs of corporations. In addition, the government has also continuously publicized the development of E2 products and clean production success stories through the press.

2.3 Collaboration System and Partnership

The Korean government has adopted the "Clean Production Technology Development and Distribution Project" (2006) and the "Energy and Resource Recycling Technology Development and Distribution Project" (2007) as a way to strengthen the environmental improvements led by the industrial sector through collaboration between governmental and nongovernmental organizations. As a part of this project, the government is providing aid (4.5 billion Korean won) to build large, medium, and small-scale green partnerships between small enterprises and corporations, in which the corporation's superior environmental management and clean production technologies are shared with the enterprise through the supply chain that is built between the partners. The green partnership project, which makes use of the supply chain between the partner small enterprise and the corporation, is part of an eco-collaboration program, and starting from 2009 is focused on building a carbon management structure for partner organizations to enable small enterprises to respond to climate changes.

2.4 International Collaboration

In terms of international collaborations, the National Cleaner Production Center under the Ministry of Knowledge Economy hosted the Korea-China-Japan Clean Production Technology Symposium in 2008 for the diffusion of clean production. Each country's reports and presentations on clean production, environmental management implementations and success stories further revitalized the technological exchange between the three countries, and established a basis for a network system for clean production exchange. Moreover, Korea will host an economic-technological exchange science and technology forum in 2009, and will seek ways to collaborate with China and Japan for the development of policies and technologies related to the environment, energy, and resource recycling.

2.5 Domestic Legal System, Administration, and Other Relevant Measures

The "the Act on the Promotion of the Transition toward an Environment-Friendly Industrial Structure" was amended (December 2005) to establish a support basis for fostering the remanufacturing industry, and an implementation structure that includes legal specificities, such as quality certification for remanufactured

products and the provision of financial support (1.3 billion Korean won in 2007) to remanufacturers. In compliance with these regulations, the Minister of Environment and the Minister of Knowledge Economy are to collaboratively select and test automobile components and electronic appliance parts for remanufacturing. Industrial machinery and electronic products, military equipment, and medical equipment will also become targets for remanufacturing in the future, in consideration of domestic industry conditions and economic impacts. Furthermore, specialized research institutes (Korea Institute of Industrial Technology, Korea Automotive Technology Institute) have been established, and a means to enact the standardized industrial classification code for remanufactured products is being devised (2007).

Also, by amending the "Act on the Promotion of Saving and Recycling of Resources (2008.3.21)," a new system was introduced that allows business owners to evaluate and manage the potential recycling of products.

3. Waste Reduction

3.1 Restricting the Use of Disposable Products

The government has been implementing the "Act on the Promotion of Saving and Recycling of Resources" since 1994 to restrain the use of disposable products. As part of this regulation, business types that frequently use disposable products, such as paper cups and plastic bags, are either restrained from the extensive use of such products or are prohibited from giving them out to costumers for free.

For example, the use of disposable cups, plates, bowls (synthetic resins, foil), chopsticks, toothpicks, and plastic tablecloths is restricted in restaurants and cafeterias. In large shops and in wholesale and retail stores, the provision of disposable bags free of charge is prohibited.

Since the adoption of the "Action Plan for Reducing the Use of Disposable Projects" by public organizations in June 2009, the use of personal mugs rather than non-reusable paper cups has been encouraged. Currently, measures for revitalizing the collection and recycling of paper cups are being implemented. The government has achieved a voluntary cooperation agreement with restaurants and caterers (13 companies and 17 brands as of March 2009), under which the business owner charges a nominal fee for paper cups, gives a discount to customers who bring their own cups, and collects take-out paper cups for recycling when customers bring them back.

Concerning disposable plastic bags, the government has achieved a voluntary cooperation agreement with wholesalers and retailers to increase the number of shops that do not give out disposable bags, in order to reduce the use of the bags in the first place. By encouraging businesses to voluntarily participate in stopping the sale of disposable plastic bags and promoting the use of shopping baskets and empty boxes, the government intends to turn the action plan into a civil campaign.

3.2 Preventing Packaging Waste Generation

In compliance with the 1993 "Act on the Promotion of Saving and Recycling of Resources", policies are being implemented to reduce unnecessary packaging materials wasted during transport, storage, handling, and usage. These policies include regulations on packaging materials that are intended to be replaced with recyclable environmentally friendly materials, as well as packaging instructions (packaging dimensions and packing sequence) that reduce the use of packaging materials. The key points of the regulations are summarized below:

< Key Points of Regulations on Packaging Materials and Method >

	Main Regulations and Standards
Packaging Materials	- The use of packaging materials (including stickers attached on products) that are laminated, coated, or contracted using polyvinyl chloride (PVC) is prohibited - Prohibit or annually reduce the use of synthetic resin materials (such as PVC) · Prohibited: Packaging materials for chicken and quail eggs, fried food, rice rolls, hamburger, and sandwich and 6 other types of food · Annual Reduction: 5 items, including egg trays, plates, bowls made of cotton
Packaging Method	- Applied to 23 manufacturers, importers, sellers: restricts size proportion (10%~35%) and number of packaging (Less than twice)

3.3 Food Waste Reduction

To improve dining culture, the government adopted the "Comprehensive Measures for Food Waste Reduction" in 2001, and has carried out various activities, including TV and radio campaigns to encourage food waste reduction, everyday action plans, and videos and posters.
As Koreans have traditionally considered a huge and elaborate meal to be a virtue, changing the dining culture has been difficult. However, public awareness of the wastefulness of traditional Korean dining culture has been gradually improving. According to the 2007 "Public Awareness Survey," 94% of Koreans shared the belief that food waste should be reduced.

As a result of the continuous promotion of the 2005 regulation banning the dumping of food waste into landfill sites and promoting the recycling of food waste as feed and fertilizer, more than 95% of food waste has been recycled. To improve the quality of the recycled products and secure a wider base of demand, the government has implemented strict facility inspection measures, and has compelled businesses to voluntarily run quality certification and damage compensation programs. The government plans to establish a recycled product distribution system that can supply the recycled products in timely manner in the future.

Recently, an energy policy regarding the production of biogas from the wastewater generated from food waste recycling has been implemented.

3.4 Waste Charge Policy

To restrain waste production and prevent the squandering of resources, the government has adopted a Waste Charge Policy. Following the polluter pays principle, the policy obliges the manufacturers and importers of products, materials, and containers that may be hazardous or are difficult to recycle and manage to share the cost of processing the waste.

Since its enactment in 1993, the methodology for selecting the applicable items has been modified, and as of now, the waste charge is imposed on 6 items, including pesticides, toxin containers, antifreeze solution, gum, disposable diapers, cigarettes, and plastic products and packaging material.

The waste charges levied are added to the Special Budget for Environmental Improvement and are used to fund research and technology development for waste reduction and recycling, and to support projects concerning recycling and the construction of waste treatment facilities, as well as to provide financial supports to waste collection and recycling efforts by local governments, and for buying and storing reusable resources.

In 2008, the plastics industry signed a voluntary cooperation agreement with the Minister of Environment to foster the recycling of plastics, and to ease the financial burden on the associated businesses. Today, the businesses that have recycled more than required under the compulsory recycling scheme are exempted from paying the waste charge.

Last year’s implementation results (from January to December) indicate that a total of 69,213 tons were recycled, yielding an economic benefit of approximately 75.9 billion Korean won. Moreover, it is estimated that as a result of these efforts,

approximately 23,532 tons of greenhouse gases (CO_2) emissions from plastic landfill or incineration were prevented.

In the future, plastic products will be exempted from the requirements of Extended Producer Responsibility Policy in steps if more than a certain proportion of the total amount of the products released to market can be recycled.

3.5 Volume-Based Waste Fee System

Administered since 1995, the Volume-Based Waste Fee System is a regressive taxation system that is calculated based on the amount of waste production. It is a modification of the previous fixed-rate taxation system that was calculated based on the property tax or the size of a building. The policy aims at reducing waste production from the source by applying the polluter pays principle, and promoting the separate disposal of recyclable waste.

The Volume-Based Waste Fee is applied to municipal solid waste and to commercial general waste that has properties similar to municipal waste, and is collected, transported, stored, and processed in a similar manner.

The Volume-Based Waste Fee requires non-recyclable waste to be disposed in a special standard bag that is manufactured and sold by the local governments, and requires recyclable waste (paper, metal, bottle, and plastic) to be collected at a specified date and place for free government collection. When throwing away large waste such as furniture and appliances, the government requires a special sticker to be purchased and attached to the waste for collection to cover the extra processing fee. Non-recyclable waste that cannot be placed in a bag, such as broken glass, must be disposed of in a special sack.

4. Recycling

4.1 Extended Producer Responsibility System

To promote recycling, the government has been administering an “Extended Producer Responsibility” system (EPR) since 2003, which obliges manufacturers and importers to recycle a certain amount of their products. At the time of introduction, only 15 products were subject to the policy, and by 2008, the list of applicable items had been expanded to include 24 items (4 packaging materials and 20 products).

Since the introduction of the system, the total amount of waste generated per person has decreased by 14.0%, from 46.62 kg in 2003 to 53.16 kg in 2007, while

the amount recycled increased by 30.5%, from 21.88 kg in 2003 to 28.56 kg in 2007. These are the results achieved by increasing public awareness on garbage separation and by actively collaborating with manufacturers and recyclers in the midst of the policy supports from the implementation of the EPR, including an improved separate disposal system, expanded and advanced recycling facilities, and upward adjustments of the compulsory recycling scheme.

The economic benefit gained from recycling 6.067 million tons of waste in the 5 years since the ERP was enacted is estimated to be 2.2643 trillion Korean won. 1.2497 trillion Korean won has been saved from reduced landfill (incineration) cost, and another 1.0146 trillion Korean won has been created from the economic value generated by the recycled products. Even after the 1.1825 trillion Korean won spent on the collection, transport, and processing of recyclable wastes is deducted, the net profit created amounts to 1.0818 trillion Korean won. When considering various incalculable benefits, including the increased number of years that a landfill site can be used, and the raw-material import substitution effects, it can be expected that many more social benefits will be gained in the future. In addition, by recycling the items subject to the EPR policy instead of land filling or incinerating, CO_2 emissions have been reduced annually by an average of 412,000 tons.

Despite these successful implementation results of EPR, several items subject to the policy are not being widely recycled, due to their low economic feasibility or insufficient publicity. For example, there are frequent civil complaints that film-based packaging materials are not being separated when disposed of because of the insufficient recycling capacity of several local governments.

To solve this problem, the government is currently reviewing a proposal to add the film packaging materials used on disposable plastic bags, and packing materials for electronic appliances, cloths, hygienic products, and household rubber gloves to the list of items subjected to the ERP. By fostering the development of recycling technology and the recycling industry and constructing an infrastructure for recycling, the government seeks to continuously extend the list of the items.

4.2 Recycling Used Electronic Appliances and Cell Phones

To build an effective recycling system for throwaway electronic appliances and cell phones, the government passed “Act on Resource Recycling of Electric and Electronic Products and Automobiles” in 2007, and devised an integrated management system that oversees every step from production to disposal in 2008.

Manufacturers and importers of 10 kinds of electronic appliances, including TVs, refrigerators, and washing machines, must abide by the law, which restricts the

content of 6 hazardous chemicals including lead, mercury, and cadmium when designing and manufacturing their products. In addition, they must modify product designs and material quality to improve recyclability, and must collect and recycle more than a certain percentage of the total amounted released.

Furthermore, for the efficient collection of throwaway electronic appliances and cell phones, the government requires product sellers to collect disposed products for free, and requires manufacturers and importers to provide useful information concerning the material composition of their products and dismantling methods to recyclers.

Although the disposal rate of cell phones is high, their collection rate is relatively low. To amend this situation, the government is running the "Used Cell-phone Collection Campaign" in collaboration with elementary/middle schools, express train stations, and wholesale stores, and is publicizing the importance of recycling and the appropriate disposal methods.

The government will continuously improve the regulations restricting the percentage of hazardous chemicals and the waste collection and recycling system in the future. Furthermore, it will gradually extend the list of items for compulsory recycling, to ultimately include all electronic appliances.

4.3 Scrap Automobiles Recycling

To construct an effective recycling system for the more than 600,000 automobiles disposed of annually, the government requires automobile manufacturers and importers to abide by the regulations that limit the content of 4 hazardous chemicals, including lead, mercury, and cadmium, when designing and manufacturing automobiles. In addition, they must modify product designs and material quality to maintain 85~95% recyclability of their products, and must collect and recycle more than 85~95% of the total amount released to the market.

Furthermore, the government has installed a recycling system and adopted recycling methods and standards appropriate for each step in processing scrap automobiles, including handling scrap automobiles and recycling automobile parts to foster environmentally friendly recycling.

In particular, scrapped automobile parts such as anti-freeze solution, which may cause changes in climate and the eco-system, have not been sufficiently recycled. However, it is expected that depending on the degree of the policy effectiveness, the recycling of such parts will greatly increase.

4.4 Construction Waste Recycling

In 2003, the"Construction Waste Recycling Promotion Act"were adopted to process construction waste in an environmentally friendly manner, and to use national resources effectively by fostering recycling.

Construction waste has increased annually due to Korea's dramatic economic advancement and population growth, and now accounts for 51% of all waste. Although approximately 97% of the 63 billion tons of construction waste produced in 2007was recycled, the recycled waste was mostly used for simple land fill and land development, and thus recycling the waste as resources with high added value to substitutes for natural aggregates is at an insufficient stage.
To increase the rate of recycling to resources with high added value to 30% by 2011, the "Framework Plan for Construction Waste Recycling" ('07~ '11) was adopted in 2006. According to this plan, public organizations must make separate contracts for construction and construction waste management, and use recycled aggregate when constructing buildings above certain size.

In particular, since asphalt concrete waste can be recycled as a resource with high added value relatively easily, the government has made compulsory the separation, storage and reuse of asphalt concrete waste to increase the recycling rate to above 50%, and has modified the policy that obliges corporate and private contractors working on public constructions to use a certain amount of the recycled concrete.

In the future, the government will strengthen the quality management standards for recycled aggregates and recycled aggregate products (such as recycled ascon), support the development of relevant technologies, construct a data management system, and continuously promote policies to diversify the uses of recycled aggregate and encourage construction waste recycling.

4.5 Revitalizing the Marketplace

To establish a culture of resource recycling, the government strives to change public opinion on the reuse of used goods and to promote a culture of sharing while approaching resource recycling and reuse with diverse policy measures.

The government has promoted the "SSSR Campaign"(Ahnabada Campaign), which stands for "Save, Share, Swap, and Reuse," to bring the reuse of goods into everyday habits, and has hosted marketplaces for exchanging or trading second-hand goods. 190 local governments (city, district, and regional) opened marketplaces in January 2009 in collaboration with the Ministry of Environment, the Ministry of Public Administration and Security, the Ministry of Gender Equality and Family and other related ministries. In March, local governments in the metropolitan area also held marketplaces.

In the future, the government plans to establish and run permanent second-hand marketplaces in each city, district, and region, and to continuously expand the markets in each local area. Furthermore, it will actively support the culture of sharing and action campaigns by developing an online information system for secondhand trading by 2012.

4.6 Resource Recyclability Evaluation

In order to restrain waste generation and resource consumption, and to reduce the burden on the environment by recycling, reusing, and retrieving energy from waste, and then processing it in an environmentally friendly manner, every step from production to disposal must be overseen.

To do this, the government adopted the"Act on the Promotion of Saving and Recycling of Resources" in 2009, and began to implement the resource recyclability evaluation policy. Under this policy, businesses voluntarily evaluate their product's recyclability and provide the information to the public, highlighting their corporate image as being a responsible enterprise and advertising their products. Moreover, the government will organize and manage the relevant information by developing a standard evaluation model and constructing an evaluation and maintenance system and a basic database based on evaluation criteria by 2013.

5. Waste-to-Energy

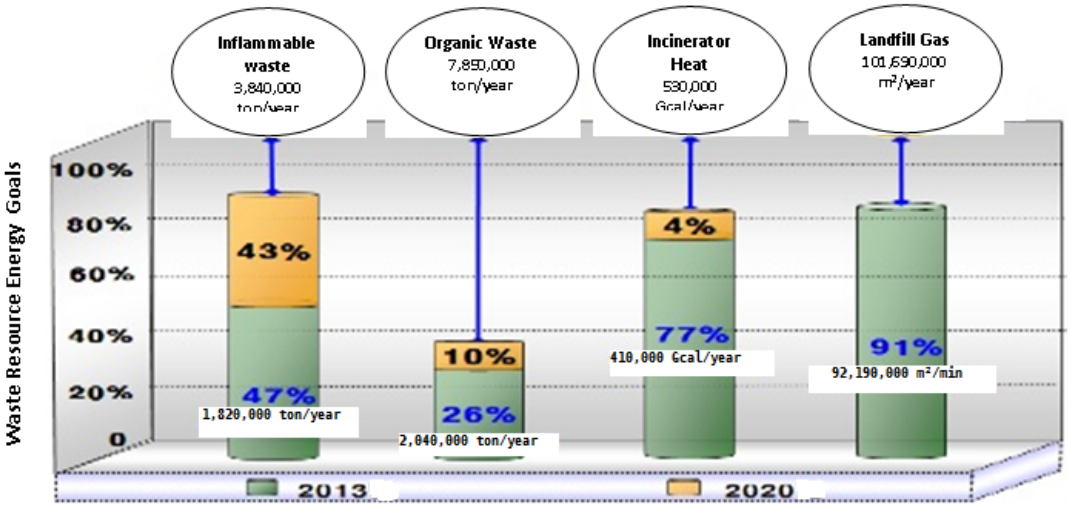
5.1 Facility Expansion and Policy Improvement

Converting waste into energy is a powerful solution to the issue of climate change, because it substitutes fossil fuel and restrains methane emissions. The Korean government has adopted the "Measures concerning Waste Resource and Biomass Energy" (Oct 2008) and its implementation strategy (Jul 2009), and has actively facilitated waste-to-energy initiatives, such as the production and development of refuse-derived fuel (RDF) generated from inflammable waste and biogas from organic waste.

In 2007, the amounts of energy generated from inflammable waste and organic waste were 3,840,000 tons/year and 7,850,000 tons/year, respectively. Only 1.5% (58,000 tons/year) of inflammable waste and 2% (160,000 tons/year) of organic waste were recycled as energy sources. However, the government is devising policies to increase the percentages of recycled inflammable and organic waste to 47% (1,820,000 tons/year) and 26% (2,040,000 tons/year), respectively, by 2013.

Furthermore, the government will collect and use 77% of unrecovered heat generated from large and mid-size incinerators, and 91% of usable landfill gas by 2013.

< *Waste-to-Energy Goals* >

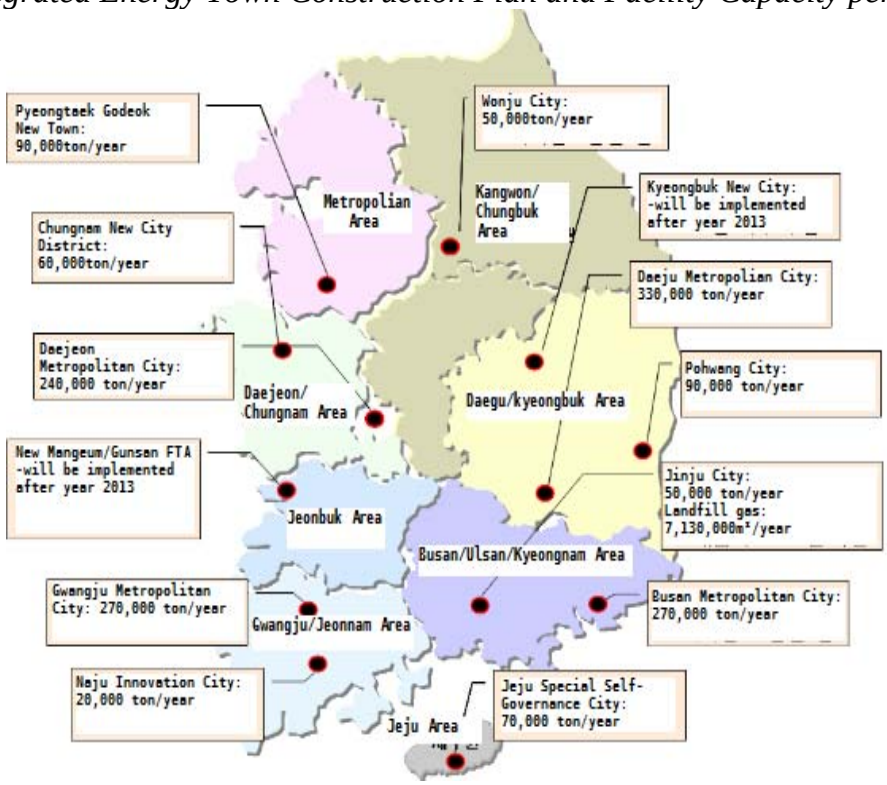


To efficiently administer the policy, the government has significantly expanded the budget, and is currently providing financial aid to 16 RDF boilers, 10 facilities that generate biogas from organic waste, 3 facilities for converting landfill gas to energy sources, and 1 facility for recovering heat energy from incinerators.

To maximize the waste-to-energy effect in the future, the government plans to expand and centralize waste-to-energy facilities and to create an environmental energy town in every district. As a part of the government's future plans, an experimental complex with natural power and a bio-energy town equipped with a RDF generator and boiler, a biogas converter for hazardous sewage, an energy converter for sewage sludge, and a landfill gas processing facility are to be constructed in one of the world's largest metropolitan landfill sites. It is expected that 40% of the national waste-to-energy goal will be met in this landfill site alone. Furthermore, the government will divide the territory into 8 zones, build metropolitan landfill sites, and construct 13 integrated environmental energy towns around new town development sites. It is expected that 43% of waste that can be converted to energy will be processed in these towns in the future.

In addition, the government is improving policies and reforms laws intended to promote waste-to-energy activities. First, the enforcement regulation of the Wastes Control Act has been changed to allow processed sewage sludge generated in public sewage processing facilities as a fuel source in coal energy power plants, and research service to amend the law for promoting waste-to-energy, such as the unification of relevant regulations and standards, has been promoted.

< Integrated Energy Town Construction Plan and Facility Capacity per District >



5.2 Low-CO_2 Green Village Building

Although rural farming and fishing communities and small towns have large amounts of potential resources that can be used as energy, including inflammable and organic wastes, forest resources, and by-products from farming and fishing, such resources are rarely used as energy sources due to unequal distribution and an inadequate amount of waste production. To increase the energy independence of rural regions using by-products such as livestock emission, food waste, and thinning logs, the government will run the "Low-Carbon Green Village" project. A trial run of this project will be completed by 2012, and 600 low-carbon green villages will be built by 2020.

6. Waste Safety Management

6.1 The Construction and Operation of the Online Waste Disposal System (Allbaro)

In 2001, the "Online Waste Disposal System" (Allbaro) system, which enables online reporting, comparing, confirming, analyzing, and ledge managing of waste processing, from disposal to final treatment, was introduced. After a successful

test run, the system has been used by businesses generating excessive amounts of the specified types of wastes, as well as by waste collecting, transporting, and processing agents who have signed contracts with the businesses since 2002.

The Allbaro digitizes and processes the waste transfer certificates that circulate between waste producer, transport agent, processing agent, and administration, and enables a user to combine, compare, and analyze previously-compiled agent license information and waste transfer data. The user can trace waste transfers, view the current waste processing stage, and process the 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.

Allbaro has been used by businesses generating specified and general waste since 2004, and it has also been used widely by businesses generating construction waste since 2005. Furthermore, for medical wastes, the Radio Frequency Identification System (RFID) has been introduced since 2005, and is currently being tested. Since 2008, RFID has been required by law, so all medical waste is being managed using RFID.

A safe and transparent management system for commercial waste has been established due to the regulation that required the filling out of an electronic transfer certificate using the Allbaro when dumping, transporting, or processing waste. In addition, statistical data on waste became more useful when devising waste-related policies, because gathering accurate statistical data became possible. As of 2008, 260,000 businesses have used the Allbaro, and information on approximately 17,000,000 tons of waste has been digitized and managed by the system.

6.2 Medical Waste Management

Medical waste is classified and managed according to its degree of hazardousness.

< *Types of Medical Wastes* >

Types		Detailed Description
Quarantine Medical Waste		In Compliance with the"Epidemics Prevention Measures"Chapter 2, Article 1: Waste produced when treating patients who have been quarantined to protect others from being infected
Hazardous Medical	**Biopsic Waste**	Human or animal cells, tissue, organ, body parts, animal carcass, blood, pus, and other blood products such as serum, blood plasma, and blood components

Wastes	**Pathological Waste**	Culture fluid, cultivation container, bacteria cultures, test tube, slide, cover glass, culture medium, gloves used in experiment and test
	Sharp Wastes	Syringe needle, surgical needle, surgical knife, acupuncture needle, dental needles, broken glassware for experiment
	Organic, Chemical	Vaccine, Anti-cancer drug, and chemical medicines
	Blood-contaminated waste	Blood bags, waste from hemodialysis and other waste containing enough blood to overflow thus requiring special care
General Medical		Surgical cotton, bandage, gauze, non-reusable diapers, women's sanitary napkins, non-reusable syringe, infusion sets contaminated with blood, body fluid, secretion, and emission

All medical waste is disposed of in special containers, but quarantine, biopsic, sharp and liquid medical waste in particular must be stored and disposed of in special synthetic resin containers. In line with demands from processing agents and waste producers, the government has allowed waste with similar properties and sources to be stored together since 2008. Consequently, solid pathological, organic, chemical, blood-contaminated, and general medical can be disposed together in bags and cardboard containers. However, disposing and storing biopsic or sharp medical waste with high contamination risk together is prohibited.

6.3 Asbestos Waste Management

Since 2008, waste that contains more than 1% asbestos, regardless of its arsenic acid level, has been classified as specific waste and is packaged twice and buried in landfill sites. When burying asbestos waste, a specific site must be designated, and necessary embankments or other barriers must be constructed so prevent the waste from being mixed with other waste.

To safely process asbestos waste, the sharing of information regarding the dismantling and demolishing of structures containing asbestos, and its proper treatment, is important. Therefore, the government is building an information sharing system for concerned parties, as well as actual condition inspections. Furthermore, it plans to improve the asbestos waste processing method through research concerning the processing and transformation of asbestos waste to energy.

6.4 Import and Export Waste Management

To implement the Basel Convention in Korea, the government has adopted the "Act on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal" (December 1992) which stipulates that private agents and businesses must gain approval from the Regional Environemntal Offices in advance when

importing or exporting types of wastes restricted for import and export by Basel and OECD.

Since August 2008, the government has strengthened the restrictions of the "Act on the Control of Transboundaryt Movement of Hazardous Wastes and Their Disposal" and now requires approval not only for importing and exporting restricted waste, but all waste.

Self-processing or commissioned-processing of all imported waste has become compulsory, and relevant transfer information must be reported on the Allbaro system when waste is being imported, transported, or processed. Moreover, any agent who transports, stores, or processes imported waste must abide by the standards and processing regulations set for commercial waste, and imported waste cannot be exported in a manner retaining the properties or condition in which it was imported.

In the future, the government plans to strengthen collaborations between stakeholders to prevent the illegal import and export of waste without government approval or declaration. Furthermore, policies would introduce an export ban order to imported and exported wastes subject only to declaration requirements if they are different from what was declared or might cause unforeseen environmental damages.

7. Radioactive Waste and their Environmentally Sound Management

7.1 National Management Policy for Radioactive Waste

The Republic of Korea determined its basic policy on radioactive waste management by passing the "National Measures for Radioactive Wastes Control" at the 249th Nuclear Power Committee on 30 Sept., 1998. This policy aims to enable an understanding among the general public about the government's will to promote safety in the process of selecting radioactive waste processing facility sites, and to emphasize the transparency of the site selection process. The points, in summary, are as follows.

a) As radioactive waste requires safe long-term management, the government shall be responsible for its handling.
b) Through the ecologically and environmentally safe handling of radioactive waste and radioactive waste, the risk to the general health of citizens and government employees shall be minimized, and all handling shall adhere to international standards regarding the safe handling of radioactive waste.

c) The creation of radioactive waste from nuclear power generation and radioisotope usage shall be minimized.
d) The costs arising from the handling of radioactive waste shall be borne by those who created the situation at the time of creation, so as to prevent passing the burden on to the next generation.
e) Through the transparent and open management of radioactive waste, the understanding and trust of general public shall be increased, and the management project will be promoted in a manner that harmonizes with the needs of the local community and contributes to local development.

On the other hand, at the 253rd Nuclear Power Committee on Dec. 17th, 2004, to secure handling facilities for mid/low-grade radioactive waste, the "National Measures for Radioactive Wastes Control" including the prioritized promotion of handling facilities for mid/low-grade radioactive waste, the improvement of the democratic and transparent nature of site selection, and the legislation to support targeted areas, were amended as follows:

a) Mid/low-grade radioactive waste is to be managed within the nuclear plant and at the radioisotope waste reserve facility, after which it will be permanently scrapped at processing facilities employing the subterranean or cave method, and the construction of single or multiple handling facilities for mid/low-grade radioactive waste shall be promoted.
b) Through the expansion of the temporary storage capability of each nuclear plant, which shall proceed until 2016, used nuclear fuel is to be managed within the nuclear plant site, and the integral management policy, including the construction of intermediate storage facilities, is to be decided later after the examination of the national policy direction and the status of domestic/foreign technology development.

7.2 Radioactive Waste Management Status

Until the completion of permanent processing facilities, mid/low-grade radioactive waste produced by nuclear plants is to be stored and managed within each nuclear plant site, and the waste generated from businesses, research facilities, and medical institutions other than nuclear plants is to be stored and managed at the radioisotope waste reserve facility. The construction size of permanent processing facilities for mid/low-grade radioactive waste, at the first stage, is 100,000 drums (200 L /drum) until 2012, and according to demand, is to be gradually and incrementally expanded to the level of 800,000 drums.

< *Status of the Storage and Management of Mid/Low-Grade Nuclear Waste* >

(As of the end of December 2008; Unit: 200ℓ drum)

Classification		Capacity	Current
Origin	Gori	50,200	39,351
	Yeonggwang	23,300	19,564
	Wolseong	9,000	7,535
	Uljin	17,400	15,329
Misc	RI Disuse Facility	9,750	5,284
	Korea Atomic Energy Research Institute	16,018	10,832
	Korea Nuclear Fuel Inc.	8,900	6,840

After use, nuclear fuel is to be managed at the nuclear plant site until 2016, by extending the temporary storage capability through the installation of dense storage zones, movement among storages, the installation of additional dry storage zones, and so forth.

< *Status on the Storage and Management of Nuclear Fuel after Use, by Nuclear Plant* >

(As of the end of December 2008; Unit: ton)

Classification		Number of Nuclear Reactors	Capacity	Current
Light Water Reactor	Gori	4	2,253	1,685
	Yeonggwang	6	2,686	1,623
	Uljin	6	2,332	1,294
Heavy Water Reactor	Wolseong	4	5,980	5,481

7.3 Legal System for the Safe Management of Radioactive Waste

The national legislation for the management and safety regulation of radioactive waste includes the Radioactive Wastes Control Act and the Atomic Energy Act.
The Radioactive Wastes Control Act reduces the risk involved in the management radioactive waste by outlining the requirements for the safe and efficient

management of radioactive waste, to protect public safety while achieving environmental preservation. This legislation is comprised of the establishment of a fundamental plan for radioactive waste management, the establishment of the Korea Radioactive waste Management Corporation (KRMC), and the installation of the Radioactive Waste Control Fund, and details the following fundamental points regarding radioactive waste management:

a) Scope of radioactive waste management and the management businesses
b) Operation standards for radioactive waste management facilities
c) Transfer of radioactive waste
d) Cost of radioactive waste management

The Atomic Energy Act outlines the basis and the fundamental points related to the use, development, and safety regulation of nuclear power. This legislation includes items regarding the nuclear power committee, the nuclear power safety committee, the integral plan for nuclear power promotion, and the construction and operation authorization of nuclear power facilities, and details the following fundamental points regarding the safety of radioactive waste disuse facilities:

a) Authorization of the construction/operation of disuse facilities
b) Examination on the installation/operation of disuse facilities
c) Regulation on radioactive waste processing (including abandonment in the sea)
d) Enclosure and transportation of radioactive waste

7.4 Waste Comprehensive Information Database (WACID)

As the domestic usage of nuclear power increases, the generation and accumulation of radioactive waste continually increases as well, and accordingly, to efficiently manage the many types and the large amount of information regarding the safe management of domestic radioactive waste, the Korea Institute of Nuclear Safety (KINS) constructed WACID (Waste Comprehensive Information Database) system, which began full operation in January 2005 following a period of test operation.

This system receives input information regarding the radioactive waste of nuclear-related businesses on a quarterly basis, and after data verification, outputs various reports, which are made available to the general public through the internet. Through the WACID system, the efficiency of regular reports on the management status of each radioactive waste-generating facility is improved, and through the individual database systems connected to the internet, the integral management of all radioactive waste information generated by nuclear-use facilities so far is enabled.

As a huge amount of radioactive waste information is handled, WACID includes a general system DB and 8 specific radioactive waste DBs (mid/low-grade waste, spent nuclear fuel, radioactive materials, etc.) to improve system operation efficiency.

The WACID system makes a significant contribution to the national safety management level of radioactive waste by supporting the establishment of national policies on radioactive waste management, through the analysis and prediction of the generation/storage flow of radioactive waste and the promotion of relevant technology development, and also plays a big role in the realization of the five principles of nuclear safety regulation (independence, openness, clarity, efficiency, and reliability) by disclosing the relevant essential information to the general public.