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(CSD)**

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## **Part I. National Reporting**

### **A. Chemicals**

#### **1. Assessment of chemical risks**

##### **1.1 Mechanisms for systematic evaluation, classification, and labeling of chemicals (GHS)**

In order to harmonize the classification and labeling of chemicals, which differs from country to country, and in turn to achieve safe control of chemicals and alleviate technological barriers to trade, the World Summit on Sustainable Development (WSSD) has encouraged nations to adopt the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) between 2002 and 2008. The major agenda includes classifying chemicals into 16 categories with regard to the level of physical hazard, 10 categories with regard to the level of health hazard, and one category with regard to the level of environmental hazard, and labeling the container and packing and marking the Safety Data Sheet (SDS) accordingly.

Korea has been participating in the process of establishing the GHS discussed by OECD since 1997, and has been promoting the research project for the domestic adoption of the GHS system since 2004. Through this project, a classification and labeling plan for approximately 2,500 simple-substance poisonous materials and 1,500 compound-substance poisonous chemicals has been prepared, and education and publicity information about the GHS system has been continuously provided to poisonous material traders and importers. This year, the classification and labeling plan prepared thus far will be reviewed, and a research project is ongoing to classify and label 1,000 compound substances.

GHS was nationally incorporated by the amendment (2006.9.25) of the “Industrial Safety and Health Act,” and through two amendments (2006.12.12, 2008.1.10) of the “Standard for Classification and Labeling of Chemicals and Safety and Health Resources of Substances (Ministry of Labor Notice No. 2008-29),” concrete standards have been established. Furthermore, GHS execution has been prepared by amending the “Hazardous Chemicals Management Act”(2007.12.27) and by preparing the “Regulation on Classification Standard and Indication Method of Poisonous Materials (National Institute of Environmental Research Notice No. 2008-26)(2008.7.8).

Major amendments include the further specialization of the chemical classification standards from 15 to 27 categories, and the unification and organization of warning sign elements such as naming, letter drawing, signal words, hazard/danger expressions, prevention guidelines, and providers, and the hazard/danger contents of the warning signs to be stated on MSDS (Material Safety Data Sheet); however, due to the time frame required for worldwide enforcement and adoption by small-to-medium sized companies, the existing

standards for chemical classification and labeling and MSDS construction are allowed to be used or applied concurrently until 2010.6.30 (2013.6.30 for medications including two or more chemicals). However, in the case of poisonous materials, according to the “Hazardous Chemicals Management Act”, GHS has been used since 2008.7.1., but considering the time required for businesses to adopt the new law, a grace period of 3 years was given on simple-substances, while one of 5 years was given on compound-substances.

Since the introduction of GHS, the Republic of Korea has provided various supports to allow for the smooth settlement of the system and for the systematic distribution of information to workplaces. From 2007 to 2009, about 3,000 copies of explanatory resources about GHS / MSDS and 200,000 guide leaflets were produced and distributed, presentations on GHS were held 41 times to a combined audience of 4,235 people at the major industrial districts and petroleum chemical districts across the country, and a special course for GHS / MSDS was opened and has since produced 403 GHS / MSDS specialists.

In addition, 6,314 of the 50,000 pieces of MSDS data have been updated according to GHS standards from 2007 to 2008, and 5,000 more are due in 2009. This information development project shall continue until 2012, which in turn will greatly assist in the security of GHS classification information for workplaces.

Along with this, concerning compound substances, the MSDS Editing program was developed and supplied in order to allow the easy preparation of MSDS to GHS standards by utilizing information on ingredients at workstations in the workplace.

On the other hand, the cooperation of the relevant authorities has been required for the enforcement of the GHS system. Accordingly, these authorities have been operating a government-joint GHS promotion committee since 2005, and have been making efforts to share and harmonize the opinions among departments about GHS adoption and practice. Currently, the major task of the committee is to unify the GHS classification/labeling of duplicate materials at each department.

In addition, according to an agreement made at the 8<sup>th</sup> Tripartite Environmental Ministers Meeting (TEMM) among China, Japan, and Korea, comparative research on actual GHS practices is being conducted, and when this project is completed in Sept. 2009, analytic results on comparative results and differences among the three countries shall be deducted, which will be of great help for the three countries, among which a large volume of trade in chemicals occurs.

## **1.2 Initiatives for assessment of toxic chemicals, hazard and risk assessment**

The Korean government has been actively participating in international efforts for the sustainable development and sound control of chemicals to implement Agenda 21, which has long been a major issue for the international community. The government is actively participating in the OECD chemicals management project, and since 1999 has been

participating in the OECD SIDS (Screening Information Data Set), which aims to manage mass-produced chemicals that are produced and imported in amounts of 1 ton or more. The government's contribution to this project includes executing the initial risk assessment on 36 chemical substances, which makes Korea the 7<sup>th</sup> largest contributor among OECD members. It is also participating in the Sponsorship Program that has been in operation since 2007 at the OECD manufactured nano-materials work detail, and performs and supports safety assessment for 5 substances.

In addition, the Korean government is reinforcing diverse policies in order to protect the safety of its citizens, to protect the environment from hazardous chemicals, and to harmonize its systems with the chemical management system supported by the international community. Since 1988, "Safety Tests of Existing Chemicals" have been performed for human and ecological virulence tests and hazard assessments on existing chemicals in domestic circulation, in order of priority. By 2007, safety tests on 553 kinds of chemicals were conducted, and 53 of them were designated as poisonous, and this information is shared with other OECD members by providing the data to the OECD database.

Meanwhile, to promote the reinforcement of virulence assessment and share the examination resources of new chemicals, OECD has set up at least 13 MPD virulence tests to be performed before the market circulation of chemicals, and is promoting a reporting system agreement, assessment resources sharing, and the cross-acknowledgment of new chemicals amongst member countries.

Accordingly, in an effort to introduce an advanced virulence assessment system and prepare a basis for sharing the examination resources, the Korean government expanded materials to be examined so as to meet the OECD MPD level, while taking the cost on the industry and the security of domestic GLP organizations into consideration. These were increased from the original 3 items to 6 items in 2007 (fish, water flea, and avian acute virulence added) and to 9 items in 2009 (skin stimulativeness, eye stimulativeness, and skin irritability added).

According to the Article 40 of "Industrial Safety and Health Act", a business proprietor (or the agent that carries out the import on his/her behalf, if such an agent exists) who wishes to manufacture or import new chemicals is required to submit an examination report on virulence/risk to the Minister of Labor 45 days prior to the manufacture/import in order to prevent health hazards to workers with respect to the chemicals. In 2008, 394 virulence/risk reports were submitted to local labor offices, and protection measures, such as supplying protection equipment and installing ventilation equipment, were put in place to safeguard the health of workers.

For hazardous/risky chemicals that are frequently responsible for industrial diseases, both an assessment tool that allows self-assessment on the hazard/risk of the major handling procedures and a guideline that provides appropriate actions according to the level of hazard/risk have been provided. There are currently 18 materials that have such a guide, and 12 more are to be added.



“Hazard/Risk Assessment Standards (Ministry of Labor Notice)” was established to prepare GLP examination standards about the characteristics and physical risks of chemicals as required by MSDS, and since 2005, 72 chemicals in total have been through GLP examination, the data for which is being provided through the Korean Occupational Safety & Health Agency’s MSDS information network.

### **1.3 Strategies for exposure assessment and environmental monitoring**

In the late 1990s, endocrine disruptors became a major international environmental issue, and with increased national attention and concern among citizens, the “Endocrine Disruptor Special Committee” was established in 1998 with the wide range of participation from the Ministry of Environment and the relevant ministries, civil experts, and NGOs. Consequently, “Endocrine Disruptor Medium/Long Term Research Project (1999)” was established and has been conducting field surveys on residual pollutants and ecology monitoring.

Residual pollutant survey aims to examine the current status of the residual amounts of dioxin, perfluorinated compounds (PFOS, PFOA), alkyl phenol, phthalate and such with respect to the environmental medium (air, water, sediment, soil) in general areas and industrial complexes. In 2007, the “5 Year Plan for Examination and Management on Endocrine Disruptor” was established, and accordingly, five relevant departments (Ministry of Environment, Ministry of Land, Transport and Maritime Affairs, Korea Food and Drug Administration, Ministry for Food, Agriculture, Forestry and Fisheries, and Rural Development Administration) have jointly conducted various projects and monitoring.

Ecological monitoring is a project that combines the examination of actual conditions such as water quality, sediment with an assessment of the impact of endocrine disruptors on the reproductive systems of fish (carp, mullet, etc.), and the internal accumulation of endocrine disruptors within them. The weight of reproductive organs, deformation, gender ratio and existence of sexually reproductive cells are examined, and by testing cells from the reproductive organs, the status of endocrine disruptor accumulation and the interrelationship with the deformation of the reproductive organs are studied.

In addition, the impact assessment is performed every three years on the peripheral areas of POPs-exhausting facilities over a certain size to examine the status of dioxin pollution in the environment and to grasp the pollution level around the major exhaustion origins. According to the POPs management law, the POPs survey network is operated to analyze the interrelationship between the exhaustion facilities and the environment of the surrounding area, and the survey points are being expanded to accumulate reliable POPs monitoring data for dioxin, PCBs (Polychlorinated Biphenyls), HCB (Hexachlorobenzene), etc.

### **1.4 Information exchange and cooperation, data-quality assurance, application of assessment criteria, and linkages to risk management activities**

In order to collectively assess the impact of chemicals on human health and environment, it

is imperative to conduct risk management based on risk assessment. In 2002, the government established the Framework Plan on risk management for substances likely to be risky, and a total of 106 substances were designated as likely to be risky. Accordingly, 17 substances including major risky materials (Pb, Hg, Cd, As, Cr, Ni, Bz) went through risk assessment through environmental monitoring and risk assessment in phases. In 2007, a combined risk assessment project taskforce was established to consider the medium transfer of risky materials, and policies to prepare a systematic basis for risk management are being promoted, such as the guidelines for combined risk assessment, exposure assessment, and local area risk assessment.

In addition, for the hazardous elements that are potentially responsible for serious health problems, an allowance standard system was introduced in July 2007 that keeps the exposure level at the workplaces under the allowance standards at all times, thus providing preemptive measures instead of post-treatment. In this regard, the “Enforcement Decree on Industrial Safety and Health Act (2008.8.21)” included 13 hazardous materials, such as normal hexane and trichloroethylene, as objects of the allowance standards, and the “Decree on Industrial Safety and Health Act (2008.9.18)” were prepared for the allowance standards for each hazardous material.

## **2. Sound management of toxic chemicals**

### **2.1 Progress within the larger framework of Strategic Approach to International Chemicals Management (SAICM) (National Implementation)**

For the effective implementation of SAICM, the Republic of Korea set the Ministry of Environment as the National Focal Point in 2006, and created and has since been operating the “SAICM Implementation Consultation Committee,” where government organizations, industry, experts, NGOs and related stakeholders discuss the action plans for national implementation of SAICM.

In February 2009, the “Chemicals Management Advancement Plan” was established, reflecting domestic chemical management policies. The major agenda of this plan is to expand the production of information on chemicals, strengthen hazard/risk assessment of chemicals, and introduce a “Green Chemical System” that encourages the production of chemical products that are free of toxic emissions and are energy-efficient.

The “Green Chemical System” encourages the expansion of the national “Green Growth” paradigm that achieves the twin domestic needs of environmental preservation and economic development, and is thought to be catalytic to the implementation of SAICM, which promotes the sustainable management of chemicals.

In addition, the Republic of Korea has been actively participating in the international efforts for chemicals management. First, it actively supported the implementation of SAICM in

developing countries by providing the Quick Start Program (QSP) trust fund towards the end of 2006. We have been actively participating in international discussions regarding “Globally Harmonized System of Classification and Labeling of Chemicals (GHS)”, and held the “Third WHO International Conference on Children's Health and the Environment” in Busan in June 2009 jointly with the World Health Organization (WHO) for an international discussion on hazardous chemicals and their impact on children’s health.

### **Third WHO International Conference on Children's Health and the Environment**

#### Overview

- Title: Third WHO International Conference on Children's Health and the Environment
- Organizer: World Health Organization (WHO)
- Sponsor: Ministry of Environment, Ministry for Health, Welfare and Family Affairs, Busan Metropolitan Government
- Date: 2009.6.8 (Mon) ~ 6.10 (Wed)
- Theme: Healthy Environment, Healthy Children
- Side-events: 12 Pre-workshops (6.7), The Third Busan Eco-Festival for Kids, Carbon Offset Fund-raising

#### Major Discussion Points and Outcome

- **Children’s environmental health issues:** impact on health from early exposure to environmental hazards, climate change, urbanization, nanotechnology, asbestos, residual toxic materials, hazardous waste, school hygiene, long-term cohort research, etc.
- **Examples of policy changes** from research results, and plan for international cooperation to reflect technical knowledge in policies and put these into practice
  - ※ **the enactment of the Environmental Health Act (Republic of Korea)**, the strategies to support children’s environmental health (United Kingdom)
- Display of **194 posters** on 26 themes (e.g. heavy metals, climate change)
- **Adoption of “Busan Declaration”**, synthesizing the views of the participants
  - ※ the **Carbon Offset Fund** collected during three days (total of 506,444 Korean Won) was **delivered to WHO to support children’s environmental health and climate change-related programs**

#### Major Components of “Busan Declaration”

- **Raising awareness and assessment** on the impact of environmental hazards on children’s health.
- **Incorporating children’s environmental health in national policies** (e.g. the national environmental health action plan, Fabian change, new responses to Green Growth.
- **Encouraging discussions** among diverse research groups in the area of children’s environmental health, and **constructing website and network** for research sharing

- **Active participation from the media, and establishing means of communication between various stakeholders**



## **2.2 Initiatives and innovations for risk reduction, particularly taking in to account the life cycle of the chemicals**

The Pollutant Release and Transfer Register (PRTR) is the system in which the polluter takes note of the amount being emitted into the environment (i.e. air, water, and soil) or moved out of the site for recycling or disposal during the production/usage procedures of work sites; each site then would exert its own effort to reduce emissions.

When Republic of Korea joined OECD in 1996, it amended its “Hazardous Chemicals Management Act” to form the legal basis for the establishment of the PRTR system. In 2001, the government announced the examination results for chemical emissions for 1996, and since then it continues to make these results public annually.

The number of chemicals and types of businesses to be registered has gradually increased, with the goal of understanding the nation-wide emission of all major chemicals. Specifically, the list of examination objects has been expanded from 80 chemicals in 2 types of businesses (petroleum refinement and chemistry) in 1999 to 388 chemicals in 36 types of businesses. Moreover, to understand the actual emission at not only the manufacturing stage of the products but also at their consumption and circulation stages, 240 kinds of boiling-point pollution sources at 9 emission origins, including farms, homes, and moving sources, were examined in 2003 for the first time to determine their emission amount.

In addition, while businesses were encouraged to reduce emissions on their own through PRTR, emissions reduction were sought more actively through the conclusion of voluntary agreements (30/50 program) for emission reduction with major emission sites. The key commitment of the agreement is to achieve 30% emissions reduction by 2007 and 50% reduction by 2009, compared to 2001 level, of the materials chosen by the businesses.

We plan to actively encourage the revitalization of chemicals risk communication, in which the local community and businesses can build mutual trust through understanding further PRTR objectives and utilizing emission information and communication.

## **2.3 Policy measures to phase out chemicals that pose unreasonable and unmanageable risk to human health and human environment**

### **a. Establishment of National Implementation System**

In order to participate in the international effort for ozone protection, Republic of Korea joined the Vienna Convention and the Montreal Protocol in February of 1992, and enacted the “Act on Control on the production, etc. of specified substances for the protection of the Ozone Layer” for implementation of the Protocol.

The key elements of this Act include the licensing system for the production, import and export of all ozone-depleting substances controlled by the Montreal Protocol, the collection of shares from manufacturers and importers of ozone-depleting substances to fund the development of alternate substances and the promotion of their usage, and restraint orders including penalties for rule violation.

For the domestic implementation of the control on ozone-depleting substances according to the Protocol, an annual plan for consumption reduction was prepared, and as of late 2007, the reduction amount has surpassed the goals required by reducing CFCs and Halons, which will be phased out by 2010, by 87% and 70% respectively, and by reducing consumption levels for carbon tetrachloride and methyl chloroform by 94% and 50% respectively.

### **b. Funds for the Rationalization of the Usage of Specific Substances**

To secure the resources necessary for the transition to a system that develops and uses alternate substances, a compulsory tax of US \$0.3 to \$1.5 per kg is levied on substances listed in Annexes A and B that are manufactured or imported.

The collected funds are used to support the research and development of substances to replace ozone-depleting substances and technology development for the use of alternate substances, and also to finance the cost required for transition into a system employing alternate substances. Through the fund, the early reduction of CFCs, Halons, and methyl chloroform has been catalyzed, and as of late 2008, a total of US \$59 million has been amassed, \$19 million of which has been used to support various projects.

### **c. Publicity Activities for Restraint from Using Ozone-Depleting Substances and Transition to Alternate Substances**

For each area that uses ozone-depleting substances – refrigeration and air-conditioning, fire extinguishing, foam, solvent – information on the development of alternate substances was disseminated to the relevant stakeholders, and fact sheets were distributed.

In order to raise awareness among consumers that purchase products that include ozone-depleting substances, information on the importance of ozone protection and the use of

alternate products was provided, to encourage the purchase of alternate products, and newsletters, posters, calendars, and fliers are also being printed and distributed.

## **2.4 Enactment of Environmental Health Act**

As health damages are occurring frequently to the residents of areas surrounding abandoned metal mines and industrial districts, and as the threat to citizens and the ecosystem is increasing due to the use of new technologies and substances, the importance of promoting environmental policies from the perspective of national health was examined, in order to consider risk assessment/management of environmentally hazardous elements and their impact on the health of residents when devising development plans. On the other hand, the health damage to citizens from environmentally hazardous elements could be studied, and the corresponding countermeasures were put in place. The government drafted the Environmental Health Act in 2008, which came into effect in March 2009 to protect the health of citizens and the ecosystems.

Accordingly, Ministry of Environment is to create a plan that includes basic policies for environmental health every ten years through consultation with the relevant ministries and the consequent review of the Environmental Health Committee. Also, the Ministry is to assess the risk of environmentally hazardous materials with respect to the health of the citizens and the ecosystems, and to devise new management measures when they exceed the risk standards set by the Ministry. In addition, it may control the application of new technologies or substances that are recognized to have high risks, and the projects that are subject to prior environmental impact review/assessment should include a criteria in its review/assessment list to assess the impact of environmental hazard elements on the health of citizens.

In addition, the accumulation of environmentally hazardous elements within an organism and the occurrence of environmental diseases are to be examined every three years, and when a risk of health damage is likely to occur due to such elements, measures can be put in place after the cause has been revealed through epidemiological examinations; and when health risk occurs or is likely to occur due to such substances, a request for a health impact investigation may be submitted to the Minister of Environment as a preemptive measure.

The exposure to environmentally hazardous substances is to be assessed for areas where children's activities take place, as set by Enforcement Decree for areas. If necessary, the use of such elements may be controlled, and those elements that may be present in products for children and jeopardize children's health may be prevented from sale or recalled, also subject to public announcement.

## **2.5 Policies and frameworks for prevention of accidents, preparedness and response**

When an accident involving hazardous chemicals occurs, prompt and effective countermeasures are provided in "Crisis Management Manual for Hazardous Chemicals

Leakage Accident,” which was created in November 2005 in preparation for a more systematic crisis management system. If the scale of the accident is extraordinary and the casualties and property damages are serious and widespread, to the extent that government action is required, the central calamity countermeasure headquarters is to be set up in the Ministry of Public Administration and Security, and the central accident countermeasure headquarters is to be established in the Ministry of Environment, and they will unfold extensive countermeasure actions to resolve the situation.

In addition, to enable the initial responses from fire departments and police departments to quickly and effectively react to chemicals accidents, “Chemical Accident Responses Information System,” was developed in April 2005 to provide in real-time the chemical property information, treatment facility information, anticipated scope of spread, guidelines for prevention and evacuation information. As of late 2008, the system was provided to 552 facilities across the country, including Environmental Offices, fire department offices, local government offices, and police department offices. The phenol leakage accident at the Kolon Gimcheon factory in March 2008 spurred the establishment of the “Chemical Information Provision System for Initial Correspondence” in three stages from 2008 to 2010, and which provides core information needed by the fire department for initial responses such as handling facility, property, and spread prevention through web-based database.

## **2.6 Policies aimed at reducing the risks posed by lead, mercury and cadmium and other harmful heavy metals**

In June 2006 the Korean government devised integrated mercury management for health protection by reducing the risk from mercury exposure and ensuring the integral management of mercury, and has since been actively promoting them. Accordingly, the control over the production and import of mercury-containing products and scraps, usage examination, and scrapping were strengthened, and examinations on the emission amount are being performed at the major mercury emission origins, such as incineration facilities and power generation facilities. In addition, by amending the Air Atmosphere Preservation Act in 1997, the government gave an advance notice that the air emission allowance level for major mercury emission facilities shall be strengthened from 2010, and in May 2009, the government devised a plan for installing a constant mercury monitoring network.

In addition, the government has been monitoring the levels of heavy metal (e.g. mercury) concentration in the blood with respect to the vulnerable, including pregnant women, newborns and infants, and children. Furthermore, for the residents of industrial districts and abandoned mine areas, the government has prepared policies to determine a systematic basis for risk assessment, including integrated risk assessment guidelines and local risk assessment guidelines with respect to high-risk substances such as heavy metals.

Also, on a nation-wide scale, the concentration level of heavy metals such as lead, mercury, cadmium in blood and urine has been annually examined since 2006. In particular, lead is designated as a restricted substance, and its manufacture, import, sale, and usage will be controlled for use in paint on wooden toys for children under the age of 13 or for metallic

accessories, starting from June 2011.

## **2.7 Quality Management and Risk Assessment of Agricultural Chemicals**

### **a. Overview**

Issues related to agricultural chemicals are strictly handled by the Rural Development Administration, according to the Agrichemicals Management Act. The objective of the Pesticide Safety Evaluation Division in the Department of Agro-food Safety at the National Academy of Agricultural Science is to ensure the safe usage of agricultural chemicals through the examination of registration documents submitted by agrichemical businesses and the conducting of human/environmental risk assessments. In addition, the quality management of circulated agrichemicals and the development of OECD-level agrichemical risk assessment are in progress, including various projects such as plans to encourage the registration of environment-friendly safe agrichemicals, to establish safety management standards for registered agrichemicals, to establish detailed guidelines for the production and examination of agrichemical registration data, to determine the status of agrichemical usage for major crops, and to inspect agrichemical quality standards.

Furthermore, there are numerous ongoing research projects, including improvements to the risk assessment system for natural-substance-based biological agrichemicals, toxicity assessment of insect physiological control substances and vegetation crude extract, and the biological monitoring of agrichemical addiction.

### **b. Major Tasks**

1. Establishing Test Standards/Methods, and Development of Registration Evaluation Methods for Agrichemicals
2. Effect/Harm/Toxicity/Persistence Assessment for Agrichemicals Pending Registration
3. Research on Safe Use Standards and Residual Allowance Standards for Agrichemicals
4. Research on Integral Assessment and Management of Physico-Chemistry and Safety of Agrichemicals
5. Quality Management and Examination/Analysis/Evaluation of Physico-Chemistry, Biological Activity of Agrichemicals

### **c. Recent Important Findings**

Following the examination/evaluation of the data of agrichemicals pending registration, it was found that all of the 10 new requests met the registration requirements, and 333 of the 381 manufactured agrichemicals passed the requirements. The agrichemical usage examination of 6 green vegetables (bare ground/facility Chinese cabbage, facility radish, lettuce, spinach, green perilla, and Korean leek) on 160 farms in 2008 showed that agrichemical usage per unit area was 2.32 for bare ground Chinese cabbage, 1.89 for green perilla, 1.37 for facility radish, 1.31 for facility Chinese cabbage, 0.94 for Korean leek, 0.47



for spinach, and 0.25 for lettuce (unit: a.i.,kg/ha).

In order to improve the quality of agrichemicals, the level of significant content and physical property were analyzed in 20 agrichemical principals, 942 circulated agrichemicals, 140 testing agrichemicals, and 24 agrichemicals against which petitions were filed. The results indicated that 931 of the 942 circulated agrichemicals were acceptable, and 8 of the remaining 11 were short on significant content, while the other 3 were defective in terms of physical properties.

The evaluation result of the 553 of 695 on effect/harm with respect to blight was mostly acceptable, but 60 of 78 had weak effects and did not meet the test standards. In terms of the results of biological quality management on 45 items, 2 were unacceptable, and the test methods for 6 new ingredients such as trichoderma atroviridae SKT-1 were established.

Observing the OECD guidelines for defining residual agricultural chemicals, the standards for defining the residual in an environmental medium were formulated, based on which residuals were defined for each environmental medium for newly-registered 19 substances. The data on crop residual of the registered agricultural chemicals were examined, and 82 substances, 47 crops, and 187 items of residual allowance standards were prepared. According to each registered agricultural chemicals, 45 new products, 16 crops, 73 items, 155 additional products, 44 crops, 252 items, 20 changed existing products, 10 crops, 22 items, for a total of 347 items of standards for safe usage of agrichemicals were proposed. Among the indices, in order to construct an agrichemicals exposure computation system, a prediction model was created, data for domestic climate and soil, crop and agricultural chemicals were provided, and estimated environmental density was calculated for 19 newly-introduced substances.

In addition, detailed guidelines and methods for agrichemicals registration test were devised. The differences between OECD and national testing standards and methods were that in the case of the acute oral toxicity testing, OECD designates TG 420, 423, 425 to be used for testing, while nationally TG 401 is used. Moreover, for the dermal irritation test, national testing include both abrasive and non-abrasive, while OECD only performs non-abrasive, and for the ocular irritation test, differences were found in the injection method.

For pesticide risk indicator, the water system risk indicators developed by OECD such as REXTOX (Ratio of EXposure to TOXicity), ADSCOR (ADditive SCORing) and SYSCOR (SYnergistic SCORing) were compared and analyzed, and research was made to formulate a national pesticide risk indicator.

To determine the exposure level of agricultural chemicals to farmers, the operational methods of UK-POEM (UK) were analyzed, and a new exposure model was established suitable for national circumstances.

## **B. Mining**

### **1. Policy and Regulations**

#### **1.1 General Information**

Korea's domestic natural mineral resources amount to 13.2 billion tons (100 million tons of 13 kinds of metallic minerals, 11.7 billion tons of 19 kinds of nonmetallic mineral, and 1.4 billion tons of coal minerals), 88.7% of which are non-metallic minerals. The 5 major non-metallic minerals (limestone, kaolin, silica stone, feldspar, agalmatolite) amount to 11.5 billion tons, taking up 87.7% of the entire natural mineral resources. These 5 major non-metallic mineral types make up 94.4% of the entire mineable ore natural resources, at 8.7 billion tons, which means that these minerals practically represent the entirety of Korea's natural mineral resources. Among these five, limestone takes up 86% with 10 billion tons, while kaolin exceeds 100 million tons in ore reserves, making these two mineral types the majority of domestic natural mineral resources.

With the growth and advancement of industry, the demand for domestic minerals has continuously increased, from 350 million won in 1990 to 470 million won in 1995, and again to 1.96 billion in 2008 (16.0% average annual growth). With the lack of natural resources, the dependency on imports continues to rise, weakening the country's ability to cope with changes in the environment, such as rising prices and lack of supply.

#### **1.2 Legal Structure and Features of Domestic Mining Industry**

Currently, the legislation governing the mining industry is Mining Industry Act, which has the subordinate laws of the Enforcement Decree of the Mining Industry Act, the Mining Industry Registration Decree, and the Enforcement Rule of the Mining Industry Registration. Other relevant laws are the Submarine Mineral Resources Development Act, the Mining Safety Act, and the Act on the Prevention and Recovery of Mine Damage.

The objective of the Mining Industry Act is to develop mineral resources rationally in order to promote the growth of national industry and to provide a basic system for the mining industry, and this was legislated in December 1951. The objective of the Mine Safety Act is to prevent damages to mine laborers and to mines, in order to promote the rational development of underground resources. For sustainable development under this mining-related legislation system, the Act on the Prevention and Recovery of Mine Damage was introduced and enacted in May 2005, to appropriately manage mine damage and in turn to protect the natural environment and to allow citizens to enjoy a pleasant environment. As such, the government is planning amendments to the Mining Industry Act, such as the exclusion of asbestos from legal minerals, to actively react to a range of serious environmental pollution issues and to advance mining legislation.

### **1.3 Major Policies for the Growth of the Mining Industry**

To promote the rational development and the stable supply of domestic natural resources, diverse policies have been put in place that encourage self-sufficiency and contribute to industrial growth by improving mine development conditions while stimulating active mine development.

In 2007, the government established its “Framework Plan for the Growth of the Domestic Mining Industry (2007-2016)” to suggest various political tasks for the stability of mineral resources and the prevention of mine damage, through an analysis of the changes in the domestic and foreign mining industrial environment and the current problems of the domestic mining industry.

Under the plan, numerous initiatives are to be promoted for the efficient development of domestic natural resources, including the investigation and revaluation of ore reserves, direct investment in metal mine development to expand the basis of the domestic mining industry, the modernization of equipment to improve the productivity of active mines, the development and distribution of advanced mining technology, the encouragement of high-level industry through the reconsideration of the added value of minerals, the expansion of technical education for the training of expert human resources, the installation of mine safety facilities to prevent mine disasters, and the strengthening of mine damage management for sustainable resource development.

The revitalization of the domestic mining industry, the accumulation of experiences necessary for foreign resources development, and the utilization of domestic natural resources can be expected through the revaluation and redevelopment of domestic mines that were in a state of disuse, which has been made possible by the modernization of redevelopment technology and advancements in retrieval technology. To make this happen, private participation is encouraged in mostly competitive metal mines under government supervision for inspection and redevelopment projects, and in 2008 five mines were promoted for redevelopment. In the future, the 1,884 mines with an active history will be set as targets, and through consideration of development conditions such as metal prices, grades, and ore reserves, revaluation projects will be promoted.

With the recent strengthening of environmental regulations such as the Act on the Protection of Baekdudaegan, pit development turnover within nonmetallic mines, processing improvement, and the extension of pollution-prevention equipment are contributing to cost increases. Accordingly, along with the expansion of financing support, the introduction of advanced financial systems, such as project financing, M&A support and credit financing systems are to be actively promoted.

Due to the dwindling size of companies in the domestic mining industry, it is hard to expect processing technology or commercial capabilities to produce mineral products with high added-value. For this reason, to produce high added-value mineral products with features

such as high-purity, small-particle, and high-performance, and for the reconsideration of domestic R&D capability, the expansion of funding support in the area of mineral product material development shall be promoted, and through the “Innovative Material Technology Development Project Group” that is part of the ETI (Energy Technology Innovation) project, the development and support of commercial technology will be promoted.

As the “Mine Safety Act” was legislated and made public in March of 1963 to prevent mine damage, the platform was technically and systematically established and 4 mine security offices located at the north, south, west, and east of areas with numerous mines were operated to manage and supervise mine security tasks. Recently, mine damage has been remarkably decreasing, and as a safety management system was built to include mine safety equipment, cave-in prevention, work environment improvement, and increased safety awareness, the damage rate per million workers dropped from 49 in 2000 to 15.7 in 2008. Also, along with the execution of the governmental supervision of safety management and the enforcement of safety education, the project for establishing a system that utilizes the sharing of large/expensive equipment with nearby mines will be continuously improved.

Mine development is naturally accompanied by a range of mine-related damages, such as refuse, tailing, acid mine drainage, and disused mine sinkage, causing damage to the natural environment and risks to human health. Since the enforcement of the “Act on Prevention and Recovery of Mine Damage,” the systematic infrastructure for mine damage prevention has been greatly improved, but the encouragement of environmentally-friendly mine development and the insurance of the sustainability of the mine industry through the persistent promotion of strict aftercare are still an important societal burden. Therefore, in accordance with the “Framework Plan for Mine Damage Prevention” of 2006, support for environmental improvement projects for mine areas, projects for mine damage prevention and damaged area recovery, and investigation/research/technical development for mine damage must be implemented, and furthermore, the realization and resolution of potential problems of mine damage-related laws and systematic issues arising from the execution of new mine damage prevention systems are to be promoted on an ongoing basis.

The extensive promotion of information organization and the automation of the domestic mine management system, the establishment of a system for mineral product circulation, the formation of agreements between private sector and government parties for the expansion of investment in mine industry, and the maintenance of mine industry legislations for advanced mine industry management are planned.

The government has prepared a plan for the advancement of domestic resource industries for the mid-to-large scale development of domestic mines and the stable supply of raw materials. The basic items on the agenda are the revitalization of competitiveness through the advancement of the mineral resource industry and the development of mid-to-large sized mines, the maximization of the effect of governmental support through appropriate role distribution between the private sector and government, the security of raw mineral materials, and the early achievement of modernization goals.

The major initiatives promoted are the division of tasks between the private sector and the government; investigation, development, safety, systematic/integral linked investment in processing business; mining, crushing/milling, transportation, and the construction of a basis for green growth through pit conversion of mineral processing/smelting facilities; linkage with industrial clusters for the joint revitalization of mining and the relevant industries; GIS DB construction and provision of investigation data to private businesses; and the development of mining expertise.

Every 3 years, the government devises a 10-year framework plan for foreign resource development, to promote the rational development of foreign resources. In order to raise Korea's self-sufficiency rate for strategic minerals<sup>1</sup>, various investment tactics are being established, such as constructing a Korean-specific resource development model with the joint entry of resource development and the infrastructure business.

As the competition for the security of resources becomes increasingly fierce, resource nationalism and environmental regulations are being strengthened, and the government manages and supervises the businesses overseas to promote responsible resource development in line with international standards, by conducting environmental influence assessment at all stages of investigation, development, production, and completion. It also actively recommends activities for the development of the local community, through the preferential hiring of locals, technical education, and global social contribution activities so as to improve the image of domestic enterprises.

As overseas sites are continuously increasing, preemptive prevention activities for local diseases such as malaria and yellow fever are actively recommended for the health and safety management of site laborers and local residents.

## **1.4 System for Sustainable Development of Resources**

### **a. Environment-Related Compulsory System**

For visible issues such as forest damage and changes in land characteristics, as most environmental issues can be technologically resolved if appropriate recovery measures are taken following the closure of mines, enterprises take responsibility for environmental management and forest recovery costs, and the government, in order to resolve the mine damage problems, utilizes the collected taxes and shares to split the environmental recovery cost with enterprises. On the other hand, for the local community and its residents, with the introduction of the mine industry, they may benefit from new employment opportunities, new business opportunities through relevant business activities, and the security of indirect social facilities that are required by mining activities, such as road and city infrastructure.

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<sup>1</sup> Strategic Minerals: minerals that have a great impact on national industry – soft coal, uranium, iron, copper, zinc, and nickel - for which either the import amount as outlined in the “fundamental plan for foreign resources development” exceeds \$100M, or the import dependency rate exceeds 90%.

The environmental impact assessment system exists as a system that requires the consent of residents for mining activities. According to the “Environmental Impact Assessment Act,” if the area of forest damage due to rock/mineral collection business is greater than 100,000 square meters, an environmental impact assessment is mandatory, and if the area is less, a prior environmental review is required. Assessment items include factors of the natural environment such as weather, soil quality, and animals/plants, factors of the life environment such as use of land, air quality, water quality, waste, noise/vibration, and the view, and factors of the social/economic environment such as transportation and historic assets.

**b. Agreement and Participation of Public/Interest Groups in Decision-Making Related to the Mining Industry**

*< Participation of Mining Industry Stakeholders >*



Stakeholders in the mining industry include the government, the local community, investment partners for resources development, cooperating enterprises, committees and research organizations, NGOs, and the mining proprietor. In order to discuss the investment expansion and issues of the domestic mining industry, the government formed the Council

for the Advancement of the Domestic Mining Industry, which is a private/public council that includes CEOs from the resource development industry, mining society, and the head of mining industry-related research organizations. At its regular sessions, issues in domestic resource development may be discussed, and efforts to reach resolution are made.

To combat the negative image of the mining industry, regular information sessions, seminars, and joint workshops are conducted for media, NGOs, local governments and local communities that emphasizes subjects such as the importance of the resource development industry, the use of environmentally-friendly technology, and the minimization of environmental damage through mine damage management. In addition, the regular publication of columns and articles to promote an environmentally-friendly image for the mining industry is promoted.

### **c. Status of National Mining Industry**

The industrial production index of the domestic mining industry has been dropping rapidly since the 1990s, and this contraction of business activities, as can be observed from the high mine abandonment rate (70% metal and 60% non-metal), leads to a contraction of mining activities, which only aggravates the circumstances of the domestic mining industry.

While domestic mineral resources maintain an annual mineral production of 2 trillion won, the share of the domestic mining industry with respect to GDP is only 0.23%. However, the economic influence of domestic non-metallic resources, such as limestone and kaolin, on 124 relevant industries was found to be 646 trillion won. Furthermore, an investigation by the Bank of Korea proved a relatively high ripple effect when grouped with industries with direct relation to non-metallic minerals, and compared to other groups among 78 industrial categories. The index of the sensitivity of dispersion<sup>2</sup>, which is the forward linkage effect that becomes higher as more non-metallic minerals are used as intermediate materials in other industries, was 2.7754, ranking 3<sup>rd</sup> after primary metal and finance/insurance/real estate. The impact factor<sup>3</sup>, which reflects the backward linkage effect, was 4.4194, appearing at the very top. This shows that the domestic mining industry has a great influence on the related industries.

While Korea's natural resources are relatively poor compared to those of resource-rich countries, with its resource types limited primarily to non-metallic rock such as limestone, many limiting elements such as the small scale of mine development, high labor costs, operation difficulties, and environmental regulations are hindering the growth of the domestic mining industry. In the meantime, 97% of domestic energy is dependent on foreign resources, and while foreign resource development policies are being promoted due to the uncertainty of mineral cost and increase in resource demand, diverse mining industry

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<sup>2</sup> The dispersion sensitivity index is the ratio of the sum of production inducement coefficients of a certain industry to the average of that of all industries. The more products of the industry are used as intermediate material for another industry, the higher the index.

<sup>3</sup> The impact factor can be calculated from the matrix of the production inducement coefficients; it is the ratio of the sum of columns of the production inducement coefficients of a certain industry to the average of the production inducement coefficients of all industries. The more domestic materials are used in the industry, the higher the index.

policies and self-preservation efforts are underway for the active development and utilization of domestic mineral resources. By placing the concept of sustainable development at the center to harmonize resource development with the environment and become an advanced resource-managing country, the domestic mining industry is changing.

## **2. Best Mining Practices**

### **2.1 Environmental Impact Assessment (EIA) and monitoring of all phases of mining operation (exploration, project development, mine operation, and mine closure)**

In order to promote direct investigation and potential mine search for the revitalization of domestic metal mine development, and to develop domestic high-value rare metals in order to promote resource security as a defense against potential international resource disputes, the Geumeum molybdenum mine was developed in April 2006. Prior to the approval and authorization of this project, the “prior environmental review of the development of Geumeum molybdenum mine” was performed to control environmental damage and reduce environmental pollution.

Also, for the prevention of pollution from the operation of the Geumeum molybdenum mine, strict inspections and other measures were put in place by the preemptive suspension of potential pollution-inducing elements from mine operation, while to encourage environment-friendly mine development, soil (5 sites) and water (3 sites) samples were collected from mines and their surrounding areas, which were analyzed by KORES technology research institute for preemptive pollution suspension through continuous monitoring of measurements.

Domestically, the feasibility of environmentally-friendly development is examined for F/S of development feasibility investigation. This is to consider the prevention and minimization of mine-related damage with respect to the environmental issues expected as a result of mine development, and after development, to consider the environmentally-friendly utilization of existing facilities for the prevention of secondary environmental pollution. The examination of environmental issues arising from mine development includes the restraining of development plans from open area development and concentrating on tunnel development, the pit installation of basic facilities such as disintegrating facilities, the environmental issues of ore concentration processing such as research on the utilization of disused materials (aggregate, non-metallic resources), the grouting of disused materials, the utilization of underground tunnels as low-temperature preservation facilities or ground heat research facilities, and a recovery and utilization plan of the site after mine closing, such as for a metal mining museum or entertainment facilities through environmentally-friendly recovery.



## **2.2 Private Public Partnership (PPP) for sustainable mining**

Mining activities are inevitably accompanied by environmental issues, the minimization of which is necessary for environmentally-friendly mine development. Also, in order to return the commercial benefit to the local community, mining businesses need to form win-win partnerships with their local communities by building an organic relationship with the local community and even the local government, through the provision of convenient facilities for local residents and the boosting of employment.

Mines are usually located in the backcountry, whose local governments, to improve the under-development of the local community, are recommended to provide administrative support for approval and authorization to attract mine development businesses, and also to participate in the investment as beneficial businesses for the governments themselves.

The case of GMC, which was promoted through the establishment of a joint enterprise of KORES and private businesses in July 2008, is a good example of a private/public partnership for sustainable mining. Four private businesses participated in this project with a 70% share, and are actively participating in the investigation project. These businesses are the ones operating limestone mines in Samcheok; synergy is created by combining the expertise of private businesses in handling customer appeals and the technological power of public organizations in such an investigation.

To contribute to the stabilization of the domestic economy, the mining industry needs to establish a supply base for the domestic demand for industrial raw materials, for which partnerships with the private sector that are led by the public sector are necessary.

## **2.3 Emergency Response Plans and Preparedness at the local level**

Regional offices (Taebaek and Iksan) are operating education/training programs to train rescue task forces in damage prevention methods, emergency response guidelines, first aid guidelines, and damage management tasks for laborers in charge of mine rescue and security duties at mines.

To prepare for potentially massive damage in mines and the surrounding areas, an emergency rescue crew is formed in the government organization, which supports preemptive measures and rescue activities for damages. Through a close, cooperative relationship with local offices and nearby mines, support for swift rescue resources, equipment, and task forces is provided. An emergency reporting network is established among the correspondents of the major mines to support emergency rescue activities, a local rescue crew, and required equipment, along with emergency relief commodities such as food and clothing.

In addition, the government has devised a crisis management manual (CMM), which outlines crisis management objectives and directions, the decision-making system, and the

crisis alarm system, and designates the roles and responsibilities to prepare the necessary steps to respond to large-scale accidents and damages.

## **2.4 Risk assessment of mines and mining activities**

Domestically, the safety evaluation of rock structures in the open area and underground was performed, and to encourage the systematic development of mines, a detailed gang safety assessment project is in progress.

The mine safety assessment project is executed in parts, and includes the safety evaluation of mining for pit development mines, the slope stability evaluation of open pit mining, the suggestion of post-recovery resolutions, and a detailed pit safety examination for the utilization of disused tunnels.

In 2005, when attempting to mine horizontal pillars from domestic limestone mines, the safety of the horizontal pillars and the dynamic stability of the rock structure were analyzed for scattered mining pits. Through such safety assessment projects, the safety of mining sites and the improvement of productivity through the operation of appropriately sized mining sites, the regulation of pit sizes that were maintainable without ground support, and the guidelines for domestic pit mining were prepared, and these are expected to be utilized for the prevention of damage to surrounding forestry and the achievement of environmentally-friendly mine development.

## **2.5 Restoration of affected communities and life-supporting ecosystems, including mine site decommissioning**

Mine damage<sup>4</sup>, which accompanies mine development, has the characteristics of “pollution, persistence, accumulation, and spreading,” which means that the damage occurs extensively over a long period of time and across a large area, and causes serious safety concerns and mass appeals, both during operation and after closing.

Thus far, the government has invested 156.6 billion won in damage prevention of general mines from 1980~2004, and 183.1 billion won for disused coal mines from 1990~2005 through the Coal Industry Rationalization Corporation (currently Mine Reclamation Corporation). Accordingly, in order to encourage efficient mine damage prevention projects, secure consistent product quality, and completely prevent mine damage, the government established the Mine Reclamation Corporation (MIRECO) under the legislation of the “Act on the Prevention and Recovery of Mine Damage” in 2005, and with the goal of completing the mine damage prevention project for disused mines in 20 years, the first phase of the Framework Plan for Mine Damage Prevention (2007~2011) was established and will be put in place for 1,344 seriously damaged sites with funding of 540.1 billion won. The funding

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<sup>4</sup> Mine damage refers to all collateral damage to the mine and the surrounding environment due to loss of debris/mineral waste, discharge of waste water, emission of mineral gas, flying dust, and generation of noise/vibration occurring from the excavation of land, mining, ore concentration, and smelting process.

for mine damage prevention is composed of shares collected from the obligators for mine damage prevention based on the special accounting and the principle of the burden of the originator, according to the “Act on Special Accounts for Energy and Resource-related Projects.” According to the Framework Plan, MIRECO removes mine damage factors arising from the mine development process (ground subsidence prevention, water pollution resolution, soil pollution recovery, damaged forestry recovery, mineral waste/debris loss prevention, and noise/vibration/dust prevention) so as to recover the damaged natural environment and construct a pleasant living environment, which in turn protects the health of residents and improves their living environment. In addition, through the practical application of the technology and research results acquired from the project execution process, the technological advancement and preparation of a basis for international cooperation in the area of mine damage prevention technology is promoted. In addition, sustainable mine development is made possible through the establishment of an environmentally friendly mining environment by pursuing mine damage prevention from the early stages of mine development.

## **2.6 Technological, institutional and social initiatives for protecting the health of mining workers**

### **a. Investigation and Aftercare of Resident Health for Closed Metal Mines**

#### **Background and Motivation**

Provoked by the Goseong closed mine incident, the “Investigation on the Impact of Heavy Metal on Agricultural Products, etc.” in open fields and closed mine areas was enacted (2005.7 ~ 2006.6) as a joint project of the relevant departments to establish a standard for heavy metal in agricultural products. The subsequent research showed that closed mine areas had a higher degree of heavy metal in agricultural products compared to open fields.

Accordingly, the government announced these investigation results and resolutions (2006.9.5, Ministry for Food, Agriculture, Forestry and Fisheries, Ministry of Knowledge and Economy, and Korean Food & Drug Administration) and prepared and promoted follow-up measures for each department. The major agenda was to investigate the heavy metal contents of soil/water/crops in areas neighboring closed mines, and through the examination of the health of residents, those with a heavy metal density over a certain level were to be cared for with the cooperation of the related departments.

#### **Major Investigation Results**

The major investigation from 2005 to 2007 includes the completion of a preemptive investigation on 401 mine sites with potential damage risk, and by selecting target mines through joint efforts with related departments, mine investigation was performed on 17 sites from mines with potential damage risk, such as mines exceeding the soil pollution standards for disused mine areas, by the execution of the “Investigation on the Impact of Heavy Metal on Agricultural Products and etc.” in open fields and closed mine areas.

As a result of the initial investigation, examinations on the influences on the health of local residents were prepared, and in 2008, urine cadmium levels, blood mercury levels, and urine arsenic levels were examined for 1,814 people from 10 sites out of 39 health examination targets. The body density of heavy metal was found to exceed recommended standards in 51 out of 1,814 people. From 2008 to 2011, a detailed annual investigation is planned by the National Institute of Environmental Research for these 39 mines. (10 in 2008, 10 in 2009, 10 in 2010, 9 in 2011)

### **Future Plans**

In the future, annual examinations shall continue with respect to disused mines with potential damage risks, and preemptive measures and resolutions for environmental pollution sources and pollution processes will be prepared.

## **b. Promotion of Safety Investigation of Heavy Metal in Agricultural Products**

### **Background**

As announced by the Ministry of Environment and the Korean Rural Community Corporation, heavy metal (cadmium, Cd) in rice was examined in farmlands with polluted soil, and the Korea Food & Drug Administration set the standard for rice cadmium level as 0.2mg/kg (2000).

As the heavy metal pollution of 44 disused mines had gained social attention, related departments (Ministry for Food, Agriculture, Forestry and Fisheries, Ministry of Environment, Ministry of Knowledge and Economy, and Korea Food & Drug Administration) cooperated to devise a response plan (2006.9.5).

- Ministry for Food, Agriculture, Forestry and Fisheries: Safety assessment with respect to heavy metals (lead, cadmium) was performed on 10 agricultural products, such as rice, Chinese cabbage and so forth, that had been grown on heavy metal-polluted farmlands of disused mines and open field areas, and products that did not meet the safety standards were purchased and destroyed by the corresponding local government.
- Ministry of Environment: Soil inspection and resident health influence inspection
- Ministry of Knowledge and Economy: Promotion of mine damage prevention projects, such as deposit/loan of land for disused mine areas not meeting agricultural standards.
- Korea Food & Drug Administration: Establishment of safety standards for agricultural products

In about 418 sites with high heavy metal risks among the 936 disused mines in Korea, over the period of 4 years from 2006, the Ministry for Food, Agriculture, Forestry and Fisheries and Ministry of Environment made joint efforts for the examination of crops and soil/water, respectively.

Year	'06	'07	'08	'09	Total
Disused Mines	44	125	125	124+13	418+13

※ The 2009 plan was 124, but 13 sites were added by the Ministry of Environment

### **Status of Investigation on Heavy Metal in Agricultural Products**

From 2001 to 2005, led by the National Agricultural Products Quality Management Service, the cadmium content of rice (brown rice) was examined for farmlands unfit for soil/crops in heavy metal pollution areas, such as disused mines.

Also, from 2006 to 2008, the examination was extended to include lead and 10 items of rice, Chinese cabbage and so forth, and the results are shown in the following table. Crops that failed to meet safety standards were bought out and destroyed by the corresponding local government, and were banned from circulation (including both disused mines and open fields).

Year	'01	'02	'03	'04	'05	'06	'07	'08
# of cases	158	57	93	64	244	898	6,959	2,660
Deemed unacceptable	38	33	6	3	31	107	139	46
Unacceptable in amount (tons)	41.7	30.1	7.0	2.8	19.4	143.8	142.5	45.5
Ratio of unacceptable crops (%)	24.1	57.9	6.5	4.7	12.7	11.9	2.0	1.7

## **2.7 Mine Closure Planning**

Since the development of small-scale mines near Pyeongyang in 1896, Korea's domestic coal industry has been more than a simple fuel or energy resource; it was at one time regarded as "the only domestic natural resource," and had a major influence on the domestic economy. But since the late 1980s, with the preference for more advanced sources of energy due to the international expansion of environmental awareness and improvements in the standards of living, the demand for anthracite has rapidly declined, and the production conditions of mines has deteriorated due to the narrowing of gangs and the need to go deeper for coal mining, hindering production and economic efficiency, eventually leading to a serious loss of competitiveness. Coal demand, which peaked at 24,295 tons in 1988, has continued to decline by a significant amount each year, and since 1989, a coal industry rationalization plan has been promoted through the closing of under-performing mines and the rational development of economical mines. As of late 2008, there were 7 operating mines, 1 dormant mine, and 341 disused mines. Through the promotion of the coal-industry rationalization plan, the local economies of mining areas, once greatly dependent on the

mining industry, are now in a state of stagnation. As such, the conversion of the local economic base through focused development of alternative industry according to local characteristics is necessary.

Most mine areas are located in mountainous backcountry areas, and as such transportation conditions are very poor, resulting in extra transportation costs. Furthermore, it is difficult to find a trained work force, and in turn, is difficult to attract alternative industries such as manufacturing. Accordingly, the government prepared a legal basis for offering support for the development of disused mine areas when an alternative business is initiated, and thus encouraged the development of disused mine areas through the legislation of the “Special Act on Assistance to the Development of Abandoned Mine Areas” in December 1995.

Accordingly, the establishment of tourism/leisure businesses such as Kangwon Land, The Dong River Cistar, Mun Gyeong Leisure Town, Black Valley Country Club, and Daecheon Resort Hotel is supported while contributing to the economic growth of mine areas, through the harmonized growth of the local economy by the active development of alternative and new businesses.

## **C. Transport**

### **1. Policies and progress on transport access**

#### **1.1 Policies and Implementation Progress on Transport Access**

The “National Intermodal Transportation Network Plan (07-19)” aims to establish a main transport system that maximizes the features and advantages of each mode of transportation. In particular, the need for a gradual increase in the share of rail transport, which has relatively high transport efficiency, is emphasized.

\* Rail (%): Passenger 13.6 ('01) → 26.2 ('19), Freight 7.6 ('01) → 15.8 ('19)

\* Road (%): Passenger 83.0 ('01) → 71.5 ('19), Freight 65.9 ('01) → 64.3 ('19)

While the optimal transport stock per GDP is 45.5%, the current transport stock in Korea is 34.1% ('03), which indicates an absolute shortage. Consequently, the Korean government, within relevant legal frameworks such as the Transport Facilities Investment Estimation Guide, plans to promote a continuous investment expansion strategy and enhance investment priority order, overlapping investments, regulation capacity, and investment efficiency.

To build an integrated transportation system with transport nodes at its center, service railway lines including the 13 routes will be expanded to make all main railroads and main highways accessible from air/sea ports and inland logistics centers within 30 minutes. In addition, a large integrated transit hub center combining transit, commercial, and cultural facilities will be constructed and expanded.

To improve the mobility and accessibility of the main forms of ground transport, the main highway network will be expanded and improved to fill the needs of over 20 million cars, so that the highways can be accessed from anywhere in Korea within 30 minutes. In order to accomplish this, the government has long term plans to construct a 7x9 grid highway system (7 north-south roads, 9 east-west roads) and to complete 5 north-south roads and 8 East-West roads by 2019.

\* Total Highway Expansion(km): 2,637 ('01)→ 5,462 ('19)

To ensure main road capacity, the government plans to increase the proportion of four-lane national roads by more than 50%, and also to expand and improve bypass roads in order to substitute for national roads (long-term required length: 1,308km). Furthermore, the government will expand and improve the ring highway system, introduce IT road maintenance, and build cutting-edge road and transport systems, such as smart highways, in order to ease the traffic congestion caused by the growth of the capital and other major metropolitan cities.

To strengthen the competitiveness of railway transport, the government plans to build an X-shaped express railway network using the Kyeongbu and Honam express railways as its backbones, and to connect this network to the Eurasian continental railway network in the future. Main railway lines will be connected to express railway lines and a 6x6 grid network (6 North-South routes, 6 East-West routes) for trains with 180~200km/hr high running-speeds will also be constructed. Once the express railways are put into service, the government plans to convert the existing Kyeongbu and Honam lines into freight lines, and to automate and improve signal systems to construct an express freight rail network.

## **1.2 Enactment of Sustainable Transport Development Act and Promotion of Green Transportation Policy**

Adopted this year, the “Sustainable Transport and Logistics Development Act” emphasizes the development of sustainable transportation/logistics systems that would allow the present generation, which is facing climate change and energy shortages, to enhance the growth potential of the future generation. It aims to shift the transport policy paradigm from the previous supplier-oriented policy that was focused on facility expansion to a new environmentally-friendly, people-oriented sustainable transportation policy that takes transportation vulnerabilities into account. The main points of the “Sustainable Transport and Logistics Development Act”, which comprises 7 Chapters and 52 Articles, are summarized below:

First, for the systematic promotion of sustainable transportation and logistics policies under the mid and long-term visions and strategies, the Act requires the national and regional self-governing organizations to adopt and implement a ‘National Strategy on Sustainable Transportation and Logistics’ and a ‘Regional Strategy on Sustainable Transportation and Logistics’ every 10 years. These strategies must include energy consumption and greenhouse gas reduction goals, transport mode shifts and other related measures, and a supply (financing) plan for needed resources. In addition, to effectively reduce the emission of greenhouse gas from the transport and logistics sectors, the Act divides the country into 3 transportation and logistics zones (organization, city, and region), and provides that a total automobile travel policy is to be set and managed for each zone. With a clear grasp of the level of sustainable transportation and the logistics system in each zone, the promotion of policies that are appropriate to local conditions and the maximization of a policy’s effectiveness become possible, by adopting investment that is tailored to local situations.

Second, the Act requires the government to adopt a sustainability management index and standards, and to regularly inspect and evaluate these in order to scientifically and reasonably administrate greenhouse gas reduction, energy use reduction, and green transport. It states that the sustainable management index must be comprised of the greenhouse gas emission amount, the traffic congestion level, the transport share structure, the energy use, and other factors, and management standards must indicate the correct level of goal achievement in detail. By establishing and examining the sustainability



management index and standards, the Act ensures feedback for the policy through a quantitative policy effect analysis. It also requires the national and regional self-governing organizations to oversee the policy implementation through the index and the standard, and to propose a policy guideline for the establishment of a sustainable transport system. In particular, by placing regions that regularly perform poorly on the sustainability management index under special care, the promotion of an intensified program for a shift to a green transport system is expected.

Third, the Act introduces diverse programs to promote the shift to a sustainable transportation and logistics system. One of these programs is the “Total Automobile Traffic Load System by Zones”, which sets the total automobile traffic for each zone, and in accordance with a voluntary agreement between local governments and the state, gives administrative or financial incentives to the regional or local governments that successfully reduce the total automobile traffic.

Furthermore, taking into account green-gas emissions and energy consumption, the Act implements the “Modal Shift Agreement”, which facilitates the shift from automobile to railway and coastal transport, and from private modes of travel to public transportation. This policy induces the state and local governments to reach an agreement concerning the modal shift with shippers and public transport users, and provides financial support when the agreement has been met. Other measures, including the development and maintenance of a greenhouse gas emission coefficient, price adjustment among transportation accounting social benefits, and a guideline for the construction of a city with a sustainable transportation system, are also adopted.

Fourth, the Act provides policy tools to stimulate the use of Non-Motorized Transport (NMT). A comprehensive plan (5-year period) that aims to increase the transport share of NMT is to be devised, and shall consist of an analysis of the present state and prospects of NMT, the objectives and general outline of the policy, and a plan for the increase in the transport share of NMT. Starting from the end of this year, The Ministry of Land, Transport, and Marine Affairs will install and build connection and transit systems in train stations, ports, and terminals for the use of NMT, and will actively implement public information campaigns and promotional activities to stimulate walking and cycling. Measures intended for the systematic revitalization of pedestrian transportation, such as designating a “Pedestrian’s Day” and adopting a pedestrian transport policy, will be promoted.

Fifth, the Act provides a support basis to encourage collaboration with non-governmental organizations in developing and diffusing environmentally-friendly transport technology. It fosters the development of environmentally-friendly modes of transportation in accordance with the National Transport Technology Development Plan (Act on the Promotion of Efficiency of National Intermodal Transport System) and enables the government to provide administrative and financial support for trial-run programs. Furthermore, to increase the use of environmentally-friendly transportation, the

government will provide subsidies to the users of environmentally-friendly modes of transport, as well as subsidies and various incentives to their providers.

In addition, the government plans to enhance educational and promotional activities, and to increase specialized centers over the long term to spread Eco-Driving of automobiles with proven 10~15% fuel efficiency. The legal basis is thus established for the development and management of the Eco-Driving program, as well as for the public education and promotional activities concerning the program, such as the designation of educational institutes.

## **2. Fuel prices and tax reform**

### **1<sup>st</sup> Energy Tax Reform ('01.7~'05.6)**

The Republic of Korea has executed tax reform that regulates the tax rate on energy sources, in order to reduce the influence of foreign economic performance. Major details include classifying oil into transportation oil and commercial oil according to its use, so that for transportation oil/LPG, the tax rate is adjusted to be higher according to gas prices to address distortions in the pricing system, while for commercial heavy oil, due to its high pollution risk and competition with LNG in the development fuel market, a new tax is applied in order to achieve balanced taxation. Furthermore, the tax rate will be adjusted incrementally from 2001 to 2006, and a portion of the funds raised through this tax reform will be used to reduce the burden on owners of small transportation businesses, such as bus, taxi, and truck companies.

### **2<sup>nd</sup> Energy Tax Reform ('05.7~'07.7)**

First, to encourage a reduction in energy consumption and suppress environmental pollution, the 1<sup>st</sup> energy tax reform was promoted, which would have gradually increased the tax rates of light oil, LPG, and butane. However, to prevent the aggravation of the problem of environmental pollution from the marketing of light oil automobiles, which had been planned since 2005, the original plan was modified and thus the 2<sup>nd</sup> Energy Tax Reform (as promoted, which would haThe major details of this second reform include increasing the transportation tax rate in order to raise light oil prices to 85% of gas prices within the next three years, and decreasing the individual consumption tax rate in order to keep LPG butane prices at 50% of gas prices.

< 2<sup>nd</sup> Energy Tax Reform Plan for Legal Tax Rate Increase >

(Unit: KRW/ ℓ)

Year	Gas		Light Oil		LPG Butane	
	Relative price ratio	Transportation Tax Rate	Relative price ratio	Transportation Tax Rate	Relative price ratio	Individual Consumption Tax Rate
'05.3	100	630	70	319	53	245
'05.7	100	630	75	365	50	210
'06.7	100	630	80	404	50	210
'07.7	100	630	85	454	50	210

### 3. Regional and global transport system integration encouraging efficient modes

A single world market is the final step of economic integration, in which the currencies and economic policies of all member states integrate to form one unified council and one central bank. Likewise, South Korea recognizes the importance of actively participating in the construction of a single Northeast Asian transport market to strengthen its competitiveness as a nation.

With South Korea entering into the age of infinite, borderless competition as a result of the Korea-US Free Trade Agreement (FTA) and the improving relationship between the two Koreas, the demand for international transport is expected to rise. Furthermore, trade and investments within the Northeast Asian economy, one of the world's three major economic zones, are expanding around Korea, China, and Japan. It is expected that market-driven integration within Northeast Asia will accelerate as the economic exchanges within the region increase. However, because Northeast Asia is the only region without a unified economic community, it is even more important that a single transport market that mutually benefits all nations be constructed.

The strategy regarding the construction of a base facility for a single Northeast Asian transport market is outlined as follows: an Asian Highway, consisting of 55 routes and extending 140,000 km, connecting 32 regions in Asia including Korea, China, Japan, Russia, India, and Iran. A Trans-Asia Railway connecting the Trans-Siberia Railway, the Trans-China Railway, the Trans-Manchuria Railway, the Trans-Mongolia Railway, the Trans-Korea Railway and other railways in Asia. It is an international railway that passes through 28 countries in the continent, and extends for 81,000 km. The expansion of an open sky policy and negotiations for the establishment of a single regional sky market are also being actively promoted. In the area of sea transport, the sea transport liberalization policy has been greatly improved, and its details are currently being negotiated.

In Northeast Asia, although the recognition of the importance of a single transport market is shared, little institutional and practical progress has been made. For this reason, after a policy collaboration framework has been established, which entails connecting the disconnected transport networks and gradually easing regulations on the transport/logistics industry, serious collaboration that aims to institutionalize the revitalization of transport/logistics network connection and the expansion of open transport/logistics markets will be needed.

#### **4. Vehicle efficiency and emissions policies**

##### **Policy Background**

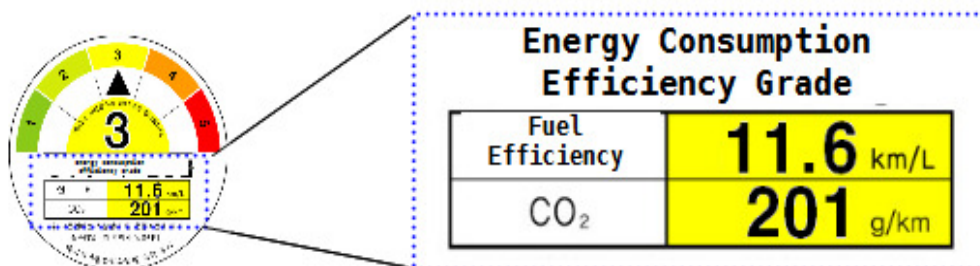
With the wide distribution of automobiles, transport energy consumption has steadily increased. Today, 21% of Korea's total energy consumption is consumed by transport, and 79% of this energy consumption is by land vehicles. Taking into consideration global oil prices and the changes brought about by climate change agreements, these figures remind us of the importance of saving energy and reducing carbon-dioxide emissions, which can only be achieved by shifting towards higher fuel-efficiency automobiles.

Taking this into account, since 1992 the government has required that an energy consumption efficiency (fuel-efficiency) grade label be attached to every automobile sold in Korea, as part of its policy to lower transport energy consumption caused by increased automobile use. By encouraging consumers to compare the fuel-efficiency grade of different models, consumers are induced to buy automobiles with higher fuel-efficiency. Since 2006, the government has also implemented an "Average Energy Consumption Efficiency System", which focuses on production management by automobile manufacturers, to induce manufacturers to improve the fuel efficiency of their products and to increase the average fuel efficiency of all manufactured/sold automobiles above a certain level.

##### **Present State of Policy Implementation**

To review some of the policies that have been implemented to promote the development and wider distribution of high-efficiency automobiles, the government first implemented the Fuel-efficiency Grade Labeling Policy (with indication of CO<sub>2</sub> emission) in 1992 to encourage consumers to rationally choose high-efficiency automobiles. The label indicates an automobile's efficiency by giving it one of 5 grades according to its fuel-efficiency, making comparisons between high-efficiency automobiles easier for consumers. Starting in 2008, the label also includes the amount of CO<sub>2</sub>, the representative greenhouse gas associated with automobiles, emitted from each automobile. By adding CO<sub>2</sub> emission indication onto the label, it can be expected that consumer awareness of greenhouse gas emission from automobiles will improve. Mini and hybrid automobiles with tax breaks applied have different fuel-efficiency and CO<sub>2</sub> emission labels attached.

< Energy Consumption Efficiency Grade (Fuel-Efficiency Grade) Label >



Secondly, the government has been implementing the Average Energy Consumption Efficiency Policy (Average Fuel Efficiency Policy), a policy similar to CAFE in the US, which requires manufacturers to calculate the weighted harmonized average fuel-efficiency of all automobiles sold, and to meet or exceed certain annual fuel-efficiency goals. This policy induces manufacturers to continuously improve the fuel-efficiency of their automobiles and to develop CO<sub>2</sub> reduction technology. Penalties are applied to manufacturers who fail to fulfill the average efficiency standard goal. In 2008, the government made an upward readjustment of the average efficiency standard goal for the year 2012. In July 2009, the government announced its plan to introduce an Optional Single Regulation Policy that would allow automobile businesses to choose one standard between fuel-efficiency and greenhouse gas reduction, and would apply a phase-in system that extends the target automobiles by degrees from 2012 to 2015, through which it is preparing a new standard that restricts greenhouse gas emissions to 140g per km and readjusts the standard of vehicle fuel-efficiency upward by 17km per Liter.

Finally, the government has provided various tax incentives to expand the distribution of high-efficiency automobiles such as minis and hybrids. First, for mini cars, the buyer is exempted from unit consumption tax, education tax, registration tax, acquisition tax, and public debt, and various benefits are applied including a 50% discount on highway toll, and a 50% discount on fees for public parking lots. For hybrid automobiles, as much as 3,100,000 Korean Won is exempted from the unit consumption tax, education tax, registration tax, and acquisition tax provided that a certain fuel-efficiency standard is met. The tax exemptions on hybrid cars have been implemented on a temporary basis from July 1, 2009 to December 31, 2012. In addition to these policies, diverse policies such as the establishment of exclusive parking lots for mini and hybrid automobiles are being promoted.

### **Policy Implementation Results**

By implementing the Fuel-efficiency Grade Labeling Policy, the government has provided objective and accurate information to consumers about the efficiency of automobiles, and has encouraged the purchase of high-efficiency automobiles. Furthermore, by introducing the Average Energy Consumption Efficiency Policy, it has motivated car manufacturers to

continuously develop technologies that improve fuel efficiency. As a result of the increased fuel efficiency of the average automobile (11.04km/ℓ('07)→ 11.47km/ℓ('08)), 488,000kl (388,000 TOE, 77.8 billion Korean Won) of automobile fuel and corresponding potential energy consumption and 1,028,000 tons of potential CO<sub>2</sub> emission reductions were achieved in 2008.

### **Recent Trends and Obstacles**

Despite the implementation of the Fuel-efficiency Grade Labeling Policy (with CO<sub>2</sub> emission also labeled), the Average Energy Consumption Efficiency Policy, and diverse tax exemptions for high efficiency automobiles, sales of mini/small-size automobiles have remained low because Korean consumers generally favor mid/large-size automobiles over mini/small-size automobiles. Moreover, considering the climate change agreements that have been committed to, the needed dramatic cut in greenhouse gas (CO<sub>2</sub>) emissions from transport energy consumption requires the promotion of policies such as fuel-efficiency labeling, not only on cars but also on mid-to-large-sized trucks, and the wide distribution of high-efficiency automobiles, high-efficiency tires, and eco-driving equipment.

### **Future Plans**

By improving the fuel-efficiency of automobiles, both the national oil consumption used in transport and CO<sub>2</sub> emissions can be reduced. To achieve these goals, effective policy reinforcements must be implemented in two major aspects: in developing technologies for improving automobile fuel efficiency, and in encouraging consumers to choose high-efficiency automobiles over low-efficiency automobiles.

For the development of fuel-efficiency improvement technologies, the government intends to continuously expand its support for automobile R&D. A mid to long-term automobile fuel-efficiency policy roadmap for strengthening the standards and penalties associated with the Average Energy Consumption Efficiency Policy is currently being devised. Furthermore, the government plans to introduce a method for measuring the fuel-efficiency and the fuel-efficiency (CO<sub>2</sub>) labeling policy for mid-to-large-size automobiles, and to come up with procedures for a tire friction test.

In addition, to encourage consumers to choose high-efficiency automobiles, the government plans to expand the list of automobiles subject to the Fuel Efficiency Grade Labeling System, revise the fuel-efficiency-based automobile tax, and increase tax incentives associated with high efficiency automobiles.

## **5. Development of any transport technology research and development**

### **5.1 Distribution of Environmentally Friendly Automobile and R & D Policy**

#### **a. Overview**

South Korea adopted the ‘Act to Promote the Development and Distribution of Environmentally Friendly Automobiles’ in 2004, which established the legal basis for the development and distribution of environmentally friendly automobiles, and divided responsibilities among the various branches of the government for the achievement of this goal. Under the Act, the Ministry of Knowledge Economy is in charge of the core technology development, while the Ministry of Environment is in charge of the distribution.

In the technology development area, the development of environmentally friendly engine and gas emission reduction equipment is being promoted (Ministry of Environment) as well as the development of hybrid cars and hydrogen cells (Ministry of Knowledge Economy). From 2004 to 2008, 40 billion Korean Won was invested annually, which amounts to approximately 200 billion Korean Won. As a part of a next-generation research field, the Ministry of Environment has invested approximately 10 billion won annually in the development of environmentally friendly engines (for example, the development of the world’s first LPG Liquid Phase Injection), an automobile that satisfies future emission and efficiency standards (bus running on Natural gas), and gas emission reduction equipment.

*< State Investment on Green Car R&D >*

Country	Implementing Organization	Investment Scale or Strategy
South Korea	Ministry of Knowledge Economy	Invested 149.6 billion Korean won on hybrid car and fuel cell automobile development (‘04~’08)
	Ministry of Environment	Invested 65 billion Korean won on developing an automobile that satisfies future standards and emission reduction equipment (‘04~’10)
United States	Department of Energy	Invested approximately 2.1 billion US dollars on hybrid car and environmentally friendly engine development (‘03~’15)
	Department of Transportation	Invested 630 million US dollars on the distribution of environmentally friendly buses (‘03~’15)
Japan	Ministry of Economy, Trade and Industry	Invested approximately 195.9 billion Japanese Yen on hybrid car and hydrogen car development. (‘98~’12)
Europe	EC	Invested 7.1 billion on clean-fuel and hydrogen cars development (‘03~’15)

※ Natural Gas Buses were developed for 1992~1998 as a part of the G7’s environmental technology development project, and were distributed for use starting from 2000

Furthermore, the government began to distribute natural gas automobiles at the end of the 1990s, and by 2008 it had distributed approximately 24,000 environmentally friendly automobiles across the nation by encouraging the purchase and adoption of environmentally friendly automobiles through subsidies. The government has provided subsidies to maintain the price difference between ordinary automobiles and environmentally friendly

automobiles, while providing various tax incentives, including tax breaks on registration and acquisition taxes, as a part of the distribution promotion measures.

*< Distribution of Environment-Friendly Cars >*

	Distribution per Year						Plans for '09
	Total	~'04	'05	'06	'07	'08	
Total	23,893	6,212	2,886	3,768	4,437	6,590	14,466
Hybrid Cars	2,458	50	312	368	656	1,072	5,000
Clean-diesel Cars (Satisfying EURO-5 Standards)	1,928	-	7	35	489	1,397	4,388
Natural Gas Cars	19,507	6,162	2,567	3,365	3,292	4,121	5,078

**b. Distribution of Environmentally Friendly Automobile and Means of R&D Implementation**

To ensure a legal means of implementation, the government has put a legal and regulatory support basis in place for the development and distribution of environmentally friendly automobiles, such as hybrids and electronic cars. The strategies for technology development and distribution are laid out in accordance with certain laws and regulations.

An example of such registrations is the “Atmosphere Environment Preservation Act.” To improve atmospheric conditions and regulate the emission allowance per fuel consumption/mileage for automobiles, the Act provides a legal basis for the distribution of natural gas buses and the establishment of natural gas refilling stations. Special regulations adopted with aim of purifying the atmospheric environment in the relatively more polluted metropolitan areas set the emission allowance standards for environmentally friendly automobiles (low-pollution), and oblige public organizations to purchase such automobiles.

As for the legal basis for the subsidies, the Ministry of Environment has implemented policies that give subsidies for the distribution of environmentally friendly automobiles, and provides loans for building recharging stations in accordance with the laws and regulations mentioned above. The Ministry has collaborated with other ministries to implement additional subsidies and tax incentives in order to accelerate the distribution of environmentally friendly automobiles, and is continuously striving to increase public awareness of such cars through diverse promotional activities.

**c. Future Plans**

As the Ministry in charge, the Ministry of Environment will work toward the wide distribution of environmentally friendly automobiles, approaching this task from various



directions, and will set up the ‘Policies for the Revitalization of Environmentally Friendly Automobile Distribution’ with the detailed goal of the distribution of environmentally friendly automobiles for the latter half of this year, and measures to achieve this goal. In terms of R&D, the Ministry will strive to secure core technologies related to environmentally friendly automobiles through continuous annual investments, and will increase the investment scale to a level equal to that of advanced countries such as the US and Japan. Furthermore, it will promote an environmental certification system (gas emission test) and reform relevant regulations to follow the development and distribution of environment-friendly automobiles.

## **5.2 Transport Technology Research and Development in Public Sector**

With changed views of R&D and economic growth, since the late 1990s technological innovation has increasingly become a more important factor than labor and capital, and the fostering of groundbreaking economic growth through R&D has become a global trend.

In the midst of this, transport-related technology requires active government investment, because despite the fact that the research results produced in the field greatly influence both states and people, transport-related technology does not attract private investment due to its uncertain profitability.

As a consequence, the government has been actively promoting various research and development programs, including a core transportation technology development project, future rail technology development, and an aviation advancement project. To date, the government has accomplished remarkable results, including the development of a “bimodal low-floor (refraction) vehicle,” a “Low-Floor Bus Standard Model,” the “Korean Express Train,” and a “Next-Generation City Railway System,” and is putting the city maglev train into use.

3.4% of the government’s total research and development budget (excluding space/aviation and maritime projects) was spent on transport technology development, which is low compared to the percentages invested by the US, Japan and Europe (5~14%). However, the Inter-Ministerial Transport Network Plan (’00~’19) strives to actively support R&D, budgeting financial aid of 4.4 trillion Korean won for these efforts.

In the future, the government will focus on resolving various longstanding issues, such as the implementation of CO<sub>2</sub> emission marketable permits in the transport sector, and the development of green technology that would reduce both distribution cost and CO<sub>2</sub> emissions to foster future green growth. By doing so, it will contribute to the state’s policy implementation efforts and the global efforts to combat environmental problems.

## **6. Road and rail systems construction standards and changes in the, in anticipation of climate change impacts**

## **6.1 Road**

For the establishment and expansion of Green Highways that will contribute to low-carbon green growth, the government plans to develop the relevant technologies and prepare the relevant standards through the design of road slope tree-planting and the establishment of construction guidelines.

In addition, to facilitate eco-friendly road construction that supports low-carbon green growth, there are plans to establish and supply a guide for road construction dealing with the area of road tree-planting, through an analysis of site application results and the reflection of the relevant new technologies.

## **6.2 Railroad**

As the social demand for eco-friendliness, energy-efficiency, and transportation safety has increased, the need to gradually extend investment in the expansion of railway facilities and the development of eco-friendly railroad cars as a major means of low-carbon transportation has emerged. Furthermore, it is necessary in the area of railroad construction to more actively examine the preparations for climate change.

To achieve this, the need has emerged for the establishment and execution of the revision of the railroad construction regulations and the legislation regarding railroad construction in order to promote economic and eco-friendly railroad construction. Key issues for revision include the obstruction factor of speed increase of regular railroad (annulment of the railway grade system), and the need for systematic support for rapidly-changing railroad technology, and these revisions are now in progress.

## **7. Capacity building needs on transport activity assessment and analysis for integrated planning**

To effectively promote an annual investment of 30 trillion Korean won in roads, railways, aviations, and harbors, a regular amount (10 billion) is required to be spent on investment analyses and feasibility evaluations. Since it was drafted in January 2001, the Investment Evaluation Guideline has gone through two revisions, the first in April 2004 and the second in December 2007, and its precision has improved. However, as the development of an elaborate investment system is at its beginning stage, and the basic data has not been updated regularly, its credibility is questionable. Moreover, there has been the criticism that although a shift to environmentally friendly, energy-saving transportation has been promoted in response to high oil prices and climate change, the investment evolution policies for this shift are still lacking.

For this reason, the demand forecasting methodology and standards, which were expected to fail due to their ambiguity, were revised, and various benefits, expenses, and other basic data were converted to present-value to reflect the present state during this year's revision of the transportation investment evaluation guidelines. By strengthening the post-evaluation and the management of agencies conducting the feasibility evaluation, the government has promoted the investment evaluation policy reforms. Furthermore, greenhouse gas and environmental value benefits have been prepared that strengthen the construction of a low-CO<sub>2</sub> green transport system.

## D. 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
<b>Policy Circumstances</b>	Worsening Pollution due to Waste	Climate Change, Raw Material and Fossil Fuel Exhaustion
<b>Objective</b>	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
<b>Core Concept</b>	“Waste”	“Resource(Recyclable / Natural)”

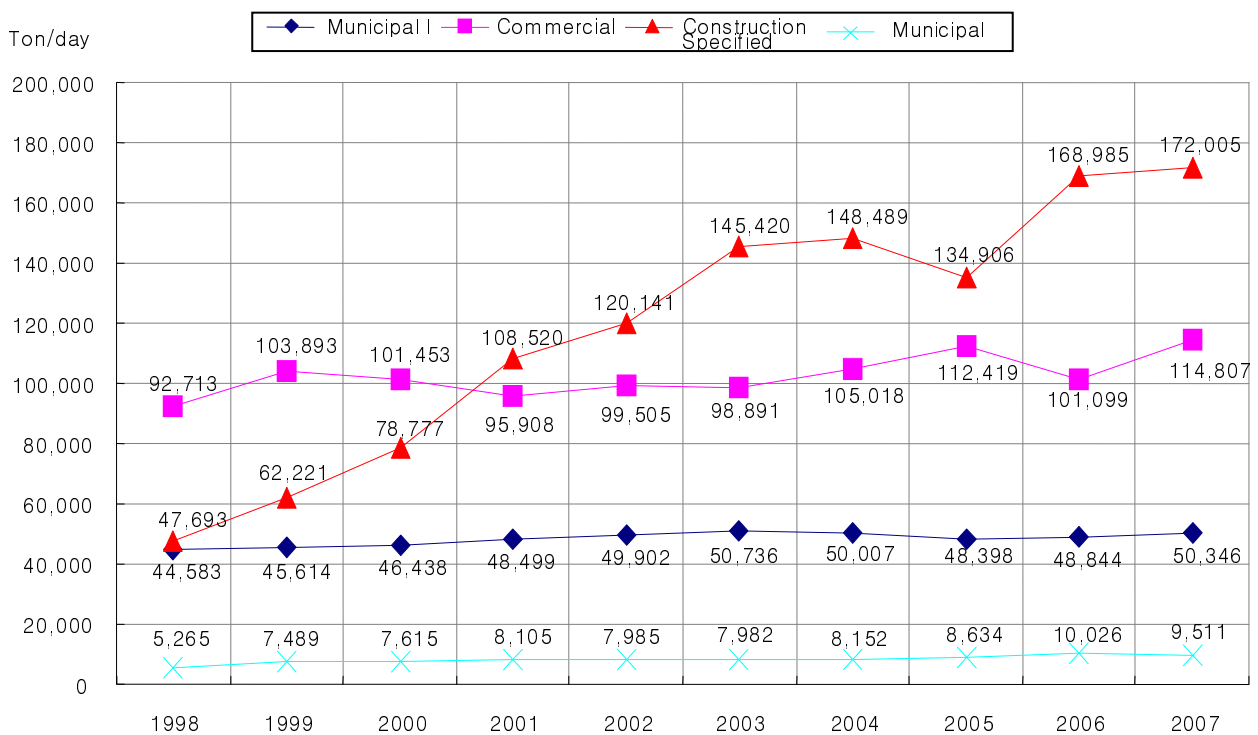
#### 1.2 Waste Generation Status

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.

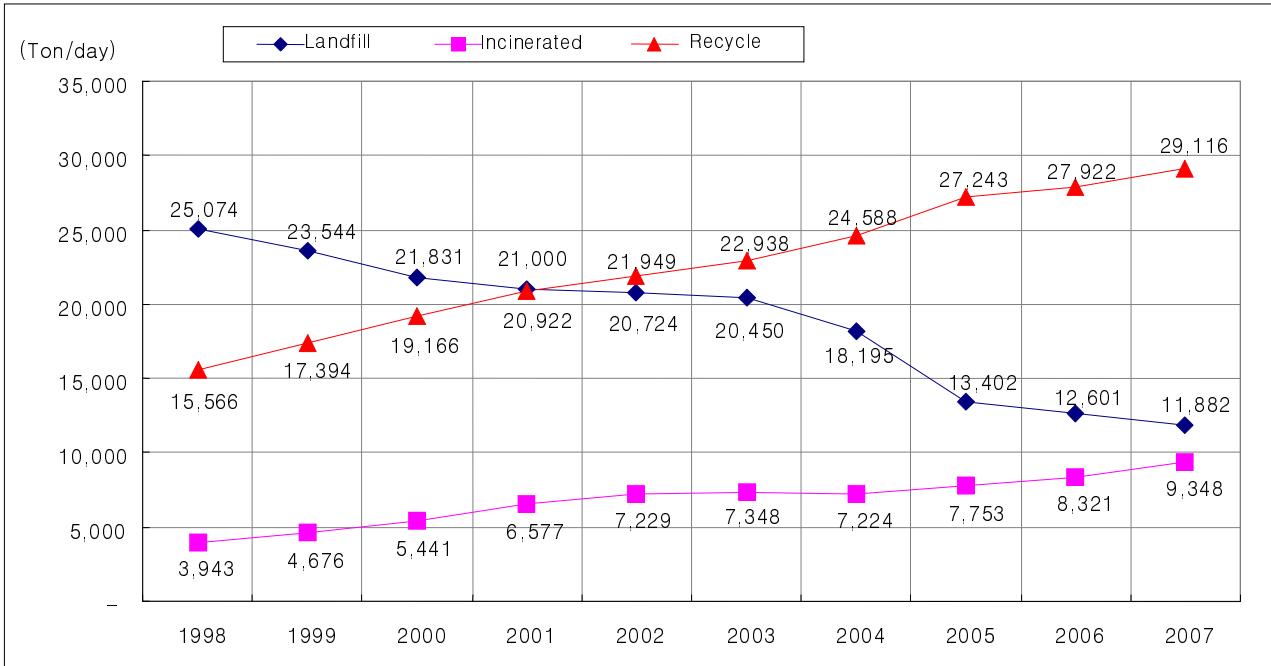
< Current Waste Generation >



### 1.3 Waste Treatment

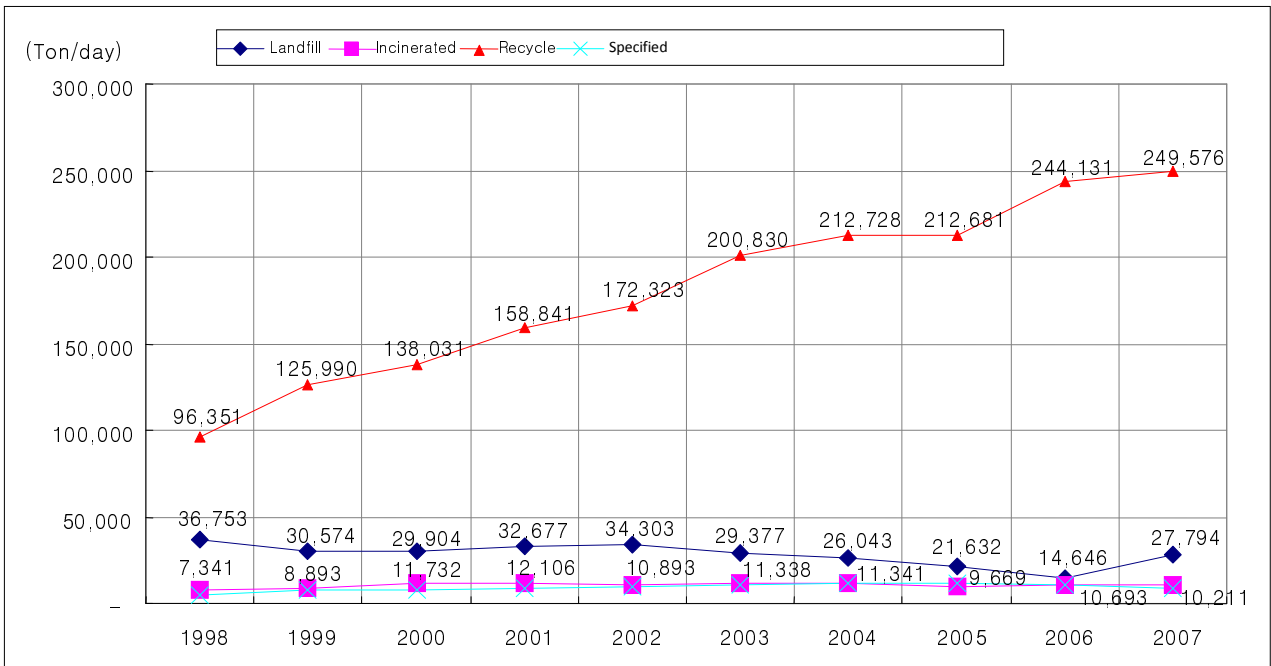
Looking at municipal solid waste, the recycling rate has increased and the percentage that is land filled has decreased, while the percentage incinerated has also increased. In 1995, 72.3% of municipal solid wastes were land filled and 23.7% were recycled, whereas in 2007, 57.8% were recycled and 23.6%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

	<b>Main Regulations and Standards</b>
<b>Packaging Materials</b>	<ul style="list-style-type: none"> <li>- The use of packaging materials (including stickers attached on products) that are laminated, coated, or contracted using polyvinyl chloride (PVC) is prohibited</li> <li>- Prohibit or annually reduce the use of synthetic resin materials (such as PVC )</li> <li>· Prohibited: Packaging materials for chicken and quail eggs, fried food, rice rolls, hamburger, and sandwich and 6 other types of food</li> <li>· Annual Reduction: 5 items, including egg trays, plates, bowls made of cotton</li> </ul>
<b>Packaging Method</b>	- 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<sub>2</sub>) 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<sub>2</sub> 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 amount 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 2007 was 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.

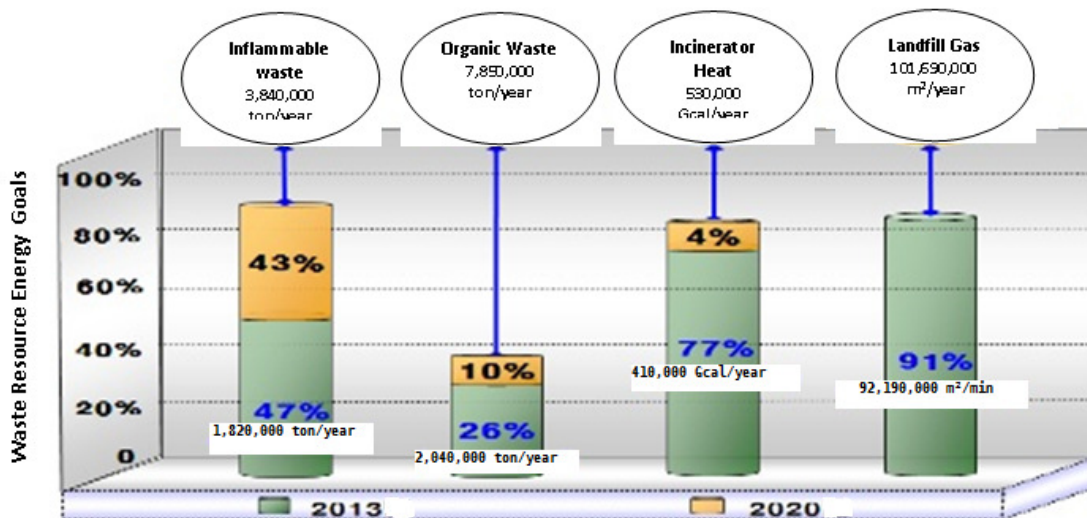
## 5. Waste-to-Energy

### 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 >



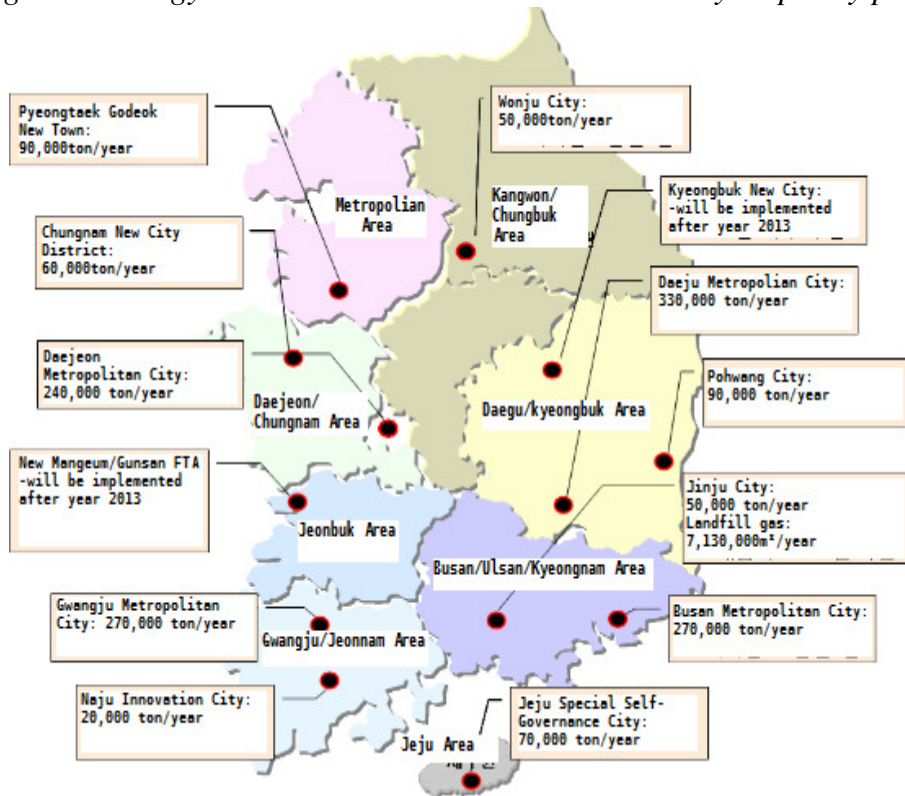


To efficiently administer the policy, the government has significantly expanded the budget, and is currently providing financial aid to 16 RDF boilers, 10 facilities that generate biogas from organic waste, 3 facilities for converting landfill gas to energy sources, and 1 facility for recovering heat 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<sub>2</sub> 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 ledger 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
<b>Quarantine Medical Waste</b>		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
<b>Hazardous Medical Wastes</b>	<b>Biopsic Waste</b>	Human or animal cells, tissue, organ, body parts, animal carcass, blood, pus, and other blood products such as serum, blood plasma, and blood components
	<b>Pathological Waste</b>	Culture fluid, cultivation container, bacteria cultures, test tube, slide, cover glass, culture medium, gloves used in experiment and test
	<b>Sharp Wastes</b>	Syringe needle, surgical needle, surgical knife, acupuncture needle, dental needles, broken glassware for experiment
	<b>Organic, Chemical</b>	Vaccine, Anti-cancer drug, and chemical medicines
	<b>Blood-contaminated waste</b>	Blood bags, waste from hemodialysis and other waste containing enough blood to overflow thus requiring special care
<b>General Medical</b>		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 Environmental 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 Transboundary 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 249<sup>th</sup> 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 253<sup>rd</sup> Nuclear Power Committee on Dec. 17<sup>th</sup>, 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
<b>Origin</b>	Gori	50,200	39,351
	Yeonggwang	23,300	19,564
	Wolseong	9,000	7,535
	Uljin	17,400	15,329
<b>Misc</b>	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
<b>Light Water Reactor</b>	Gori	4	2,253	1,685
	Yeonggwang	6	2,686	1,623
	Uljin	6	2,332	1,294
<b>Heavy Water Reactor</b>	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.

## **E. The Ten Year Framework of Programmes on Sustainable Consumption and Production Patterns**

### **1. The inclusion of SCP in national policies: Green Growth**

#### **1.1 Background and Concept**

In order to resolve the global energy and resource crisis related to global warming, which has had a significant influence on the Republic of Korea, the government announced its adoption of “low-carbon green growth” as a national vision for the next 60 years, through a speech given at a memorial ceremony for the 60<sup>th</sup> Anniversary of Korea’s National Foundation in August 2008, supplementing the abstract nature and wide scope of sustainable development with respect to policy realization. This involves adopting an eco-friendly pattern of economic development, and is a new national development paradigm that attempts to break the connection between economic development and environmental disruption.

The concept of green growth will be manifested in three aspects. The first is a virtuous cycle of the environment and the economy. Through a transformation of the growth pattern and economic structure that maximizes the synergies of the environment and economy, the greening of core key industries, the promotion of low-carbon green industries, and the greening of the value chain shall be promoted.

The second aspect is improving the quality of life, and promoting a green revolution in life patterns. It involves the implementation of green living everywhere in our lives, including land, cities, buildings, and residential areas, preparing a base for green consumption, vitalizing green transportation such as buses, subways, and bicycles, and improving transportation efficiency based on an intelligent transportation system.

The third aspect is establishing a national position that conforms to international expectations. By actively responding to international discussion of climate changes, green growth can be utilized as a new driver of national development, and by taking an international leadership role as a green bridging nation, improved standing as a green advanced nation can be expected.

#### **1.2 National Strategies for Green Growth**

To realize this vision of green growth, the Presidential Committee on Green Growth was established in February 2009. In addition, the government and the private sector has jointly devised reports for “National Strategies for Green Growth” and “5-year Plan” and following the collection of opinions from interested parties, the “National Strategies for Green Growth and 5-year Plan” was officially announced on 14 July 14, 2009.



< Vision for Green Growth >



### 1.3 5-Year Plan for Green Growth

From these national strategies for green growth, a 5-year plan was derived reflecting detailed tasks and estimates by year and by industry. This is a mid-term plan to prepare a fundamental basis for achieving the national vision of green growth, realizing the political commitment of the current government.

< Core Projects Roadmap for the 5-Year Plan for Green Growth >

10 Major Aims	Core Projects	Major Expectations
<b>Efficient reduction of greenhouse gas</b>	<ul style="list-style-type: none"> <li>- Reducing greenhouse gas</li> <li>- Disclosure of carbon information</li> </ul>	Carbon information disclosure rate (%) (’09) 10 → (’13) 40
<b>Oil alternatives/energy independence</b>	<ul style="list-style-type: none"> <li>-Management of energy objectives</li> <li>- Export of nuclear power plants</li> </ul>	Unit of energy resources (toe/\$1k) (’09)0.317 → (’13)0.290
<b>Strengthening adaptability to climate changes</b>	<ul style="list-style-type: none"> <li>- Recovery of 4 major rivers</li> <li>- Coast vulnerability map</li> </ul>	Secured water resources (100M m <sup>3</sup> ) (’09)186 → (’13)200
<b>Development of green technology industry</b>	<ul style="list-style-type: none"> <li>- Green Tech Initiative</li> </ul>	International share of green technology products (%) (’09) 2 → (’13) 8.0
<b>Greening of all industries</b>	<ul style="list-style-type: none"> <li>- Carbon Partnership</li> <li>- Zero-Emission industrial district</li> </ul>	Industrial district greenhouse gas reduction (1ktons) (’09) - → (’13)2,000
<b>Highly developed industrial structure</b>	<ul style="list-style-type: none"> <li>- U-running vitalization</li> <li>- Development of future core materials</li> </ul>	Export of broadcast-communication integral industry (\$100M) (’09) 520 → (’13) 1,237
<b>Formation of green economy base</b>	<ul style="list-style-type: none"> <li>- Discharge right trading system</li> <li>- Green stock index</li> </ul>	Size of domestic carbon market (KRW 100M) (’09) - → (’13)0.5
<b>Formation of green national transportation</b>	<ul style="list-style-type: none"> <li>- Vitalization of green buildings</li> <li>- Vitalization of bicycle usage</li> </ul>	Share of Public transportation(%) (’09) 50 → (’13) 55
<b>Green revolution in lifestyles</b>	<ul style="list-style-type: none"> <li>- Carbon labelling</li> <li>- Carbon point system</li> </ul>	Green purchases (unit: KRW 100M) (’09) 2.5 → (’13) 4.0
<b>Model country for green growth Green Growth Model Nation</b>	<ul style="list-style-type: none"> <li>- Greening of Public Support to Development</li> <li>- Green Growth Management of international Index</li> </ul>	Green ODA weight (%) (’09) 14 (e) → (’13) 20

## **2. Green public procurement policies, laws and regulations**

### **2.1 General Overview**

#### **a. Public Procurement System**

Public procurement in the Republic of Korea consists of distributive procurement, which supplies the commodities demanded by various agencies (government agencies, local governments, and public agencies), and central procurement of commodities beyond a certain level, such as materials for facility constructions and special local government constructions ordered through the Public Procurement Service (PPS). The total amount of public procurement is 11.1 billion won (2008), representing 11% of the GDP.

#### **b. Role and Function of Public Procurement Service**

The Public Procurement Service (PPS) is responsible for a range of procurement tasks, including the purchase/supply of various commodities and construction contracts required by public agencies, the storage of major raw materials, the management of government commodities, the management of national property, and the operation of the Korean ON-line E-Procurement System<sup>5</sup>. Procurement administered by the PPS represents 30% of all public procurement.

By utilizing the strength of its buying power, the PPS is promoting the establishment of a green procurement system as a major priority in order to provide an initial impetus to the green market, and its major points are the preferred purchase of green products, the construction of an infrastructure for market expansion, and the supply of eco-friendly public facilities.

### **2.2 Implementation Methods for Green Procurement Policy**

#### **a. Cross-governmental Scheme**

“Encouragement of the Purchase of Environment-friendly Products Act” stipulates the mandatory purchase of environment-friendly products for public institutions. Environment-friendly products are defined as the products with E-mark (environment mark) certification, GR-mark certification (good recycling mark), or other environment-related certifications.

In addition, “Energy Use Rationalization Act” provides for energy efficiency management schemes including mandatory energy efficiency marking, high energy-efficiency certification system, stand-by energy reduction program, building energy-efficiency

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<sup>5</sup> \*Korea On-line E-Procurement System is a national integral electronic procurement system for contracts for construction, service, and manufacture / supply of goods, which has been established in order to electronically process public procurement tasks between public agencies and procurement businesses, from business registration to bidding, contract, and payment.

certification system, etc. It also stipulates the promotion of high-energy efficiency products, energy conservation products and high energy-efficiency equipment while prohibiting the manufacture and sales of products that do not satisfy the minimum energy efficiency requirement.

### **b. Implementation Schemes at the PPS level**

Green tech products such as eco-friendly products and energy-saving products are given preferential treatment with respect to governmental purchase, such as the exemption from eligibility evaluation when Multiple Award Schedule (MAS)<sup>6</sup> contracts are made, selection as procurement excellence product, and the expanded application of bonus points in eligibility assessment.

To construct and operate an infrastructure to support the market, the PPS also operates a corner in the Korean ON-line E-Procurement System that deals only with certified products such as eco-friendly products and highly energy-efficient equipment, and is expanding the annual (unit cost) contracts of green tech products, such as green cars, ultra power-saving LED lighting devices, CNG buses, and bicycles.

The PPS has also adopted policies for the supply and expansion of highly energy-efficient public facilities, which include strengthened energy evaluation standards for the design of public facilities and the pre-evaluation of bidder qualifications, and the promotion of the use of high-efficiency equipment during the construction process.

### **c. Future Plans**

Working in cooperation with the relevant agencies, PPS plans to establish a roadmap that details its short-term, mid-term, and long-term green procurement goals and policies, and in the future, considering procurement size and ripple effect, plans to select priority items (areas) for green procurement (Quick Win tasks), establish corresponding procurement guidelines (environmental standards), expand green car procurement in the public sector, and gradually drive non-eco-friendly products (high carbon emission) out of the procurement market.

Furthermore, in the facilities area, the establishment and provision of order guidelines for eco-friendly facility construction and the introduction of eco-friendly structure certification for public facilities are being considered. In the area of goods management, there are plans to promote the expansion of government goods recycling, waste reduction, and green product usage requirements for major goods as major tasks.

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<sup>6</sup> \*MAS (Multiple Award Schedule): A system in which contracts are made with multiple suppliers that offer products with identical or similar quality / performance / efficiency.

### **3. Instruments for sustainable consumption**

#### **3.1 Promotion of Green Start Campaign**

##### **a. Outline**

In response to the national vision of “low-carbon green growth,” which was announced at the 8.15 speech in 2008 as a key point in national advancement, and in recognition of the need to reduce greenhouse gas dramatically in our everyday lives along with the development of green industry/technology for the early realization of green growth, the Green Start Campaign has been promoted as a national movement for greenhouse gas reduction, and is forming a coalition that includes the government, the private sector, and non-governmental organizations to reduce the excessive use of fossil fuel and to systematically respond to climate change.

The major goals of the Green Start Campaign include the promotion of public participation for the reduction of greenhouse gas (43%) in non-industrial sectors (i.e. residential and commercial), the development of an incentive system for the use of green products, the promotion of a low-carbon lifestyle for the realization of a 21<sup>st</sup>-century green era, and in the short term, expanding the construction of local networks in 2009 (143, excluding Gu-level) and greenhouse gas reduction agreements for 1 million people.

Major tasks for the Green Start Campaign include expanding local networks and securing funds, raising general awareness through public participation events, promptly promoting national events through close cooperation with local government, strengthening the incentive system to induce the practical participation of the public, training green leaders with the goal of reaching 5,000 green leaders in 2009, and the vitalization of the cyber Green Start Campaign.

##### **b. Major Outcomes**

Major results include the actual development of the Green Start Campaign through a public participation movement and a strengthened incentive system to create a national atmosphere, the recruiting and training of green leaders (about 3,500), and the establishment of a base for the cyber Green Start Campaign.

Detailed results include the speedy promotion of the construction of a network base, as in the nationwide establishment of local networks following the construction of a national Green Start network [’08.10, 32 agencies/organizations (currently 36)] so that 176 local governments (16 metropolitan, 160 local) have completed local network construction during the last seven months (as of June 2009), and strengthening the promotion of the private-sector greenhouse gas reduction project by securing national Green Start Network bureau officers and funds (1.5 billion won), and participation in the subscription project for greenhouse gas reduction (23 projects, 500 million won) and its related publicity activity.

In April 2009, a connection was made between local government events and the Green Start Campaign through the large-scale joint promotion with local governments of public participation events such as “Climate Change Week” (4.17~4.26), which attracted 816 organizations and 776 thousand people nationwide to raise awareness of the need for practical participation to respond to climate change; in June 2009, during “Greenhouse Gas Diagnosis Week” (4.17~4.26), a diagnosis manual was distributed nationwide to apartment-dwellers and families with children in elementary/middle school; 700 green leaders visited and diagnosed 36,000 households; 25,000 students received diagnosis education with a carbon footprint calculator; and online diagnosis and lights-off event (6.20) for the general public were promoted at the same time. In addition, the Clean Korea Green Start Event (March), cool style (proclamation, 6.19) and echo campus movement (public subscription, 7.4) were also promoted.

< Climate Change Week Event Photos >



Climate change week opening ceremony (Seoul)



Greenhouse gas reduction participation covenant



Opening ceremony with green readers



Ban Ki-Moon Marathon (Eumseong)



Earth model sauna experience (Seoul)



Green Start launch ceremony (Pyeongtaek)

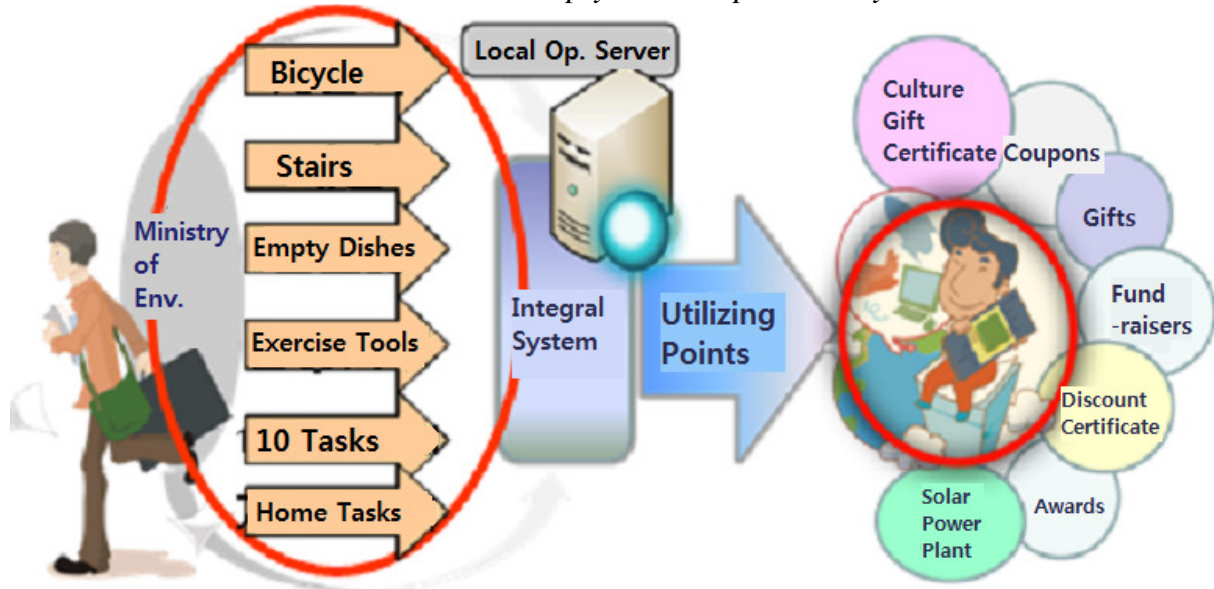
In order to strengthen and expand the incentive system, which encourages the self-motivated participation of individuals and organizations in greenhouse gas reduction, a carbon point system, green point system and empty dish hope bank was established.

The carbon point system was executed through the participation of local governments all over the country beginning in July, and was followed by pilot projects for 24 participating local governments ('08.11~'09.6). At the same time, to expand the workplace greenhouse gas reduction movement, the green point system ('09.5), which provides incentives to employees that participate in the use of bicycle/public transportation, the elimination of



food waste, and the empty dish hope bank ('09.4) was executed, and Green Start savings (Gwangju network) and the green credit card project (metropolitan offices) were implemented through cooperation with IBK (Industrial Bank of Korea).

< Green Points and Empty Dish Hope Bank System >

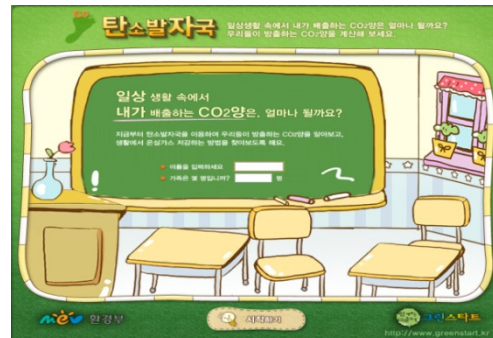


At the opening ceremony for the 1<sup>st</sup> climate change week (4.17), the future green leaders who were to be educated under the training plan were introduced for the first time. Approximately 3,500 individuals were recruited to be systematically trained as green leaders, the national pioneers and leaders of greenhouse gas reduction in everyday life. 700 green leaders participated in the apartment (36,000 households) diagnosis project during the 1<sup>st</sup> greenhouse gas diagnosis week (6.22~6.27)

In addition, a base was established for the cyber Green Start Campaign, and a green start network homepage was subsequently constructed ('09.2), an online participation covenant was promoted ('09.3~) with the cooperation of the major internet portal companies, and a carbon footprint calculator that notifies users of the carbon dioxide emissions they produce in their everyday lives was constructed and utilized to raise general awareness of the need to respond to climate change.



Green Start Homepage



Carbon Footprint Calculator

Broadcast (radio) and newspaper advertisements were put in place, and through efficient publicity activities during the last five months, such as the posting of publicity materials at major locations, the KBS Open Concert for the 1<sup>st</sup> climate change week (4.26), the promotion of a “covenant for the Earth” jointly with JoonAng Ilbo (4.22~), and making 45,000 copies of the “Green Start! CO<sub>2</sub> Reduction All Together” sticker and posting it at bus terminals across the country (4.1), thus receiving more than 300,000 signatures.

### c. Case Study: Campaign for Public Participation

#### ■ Background

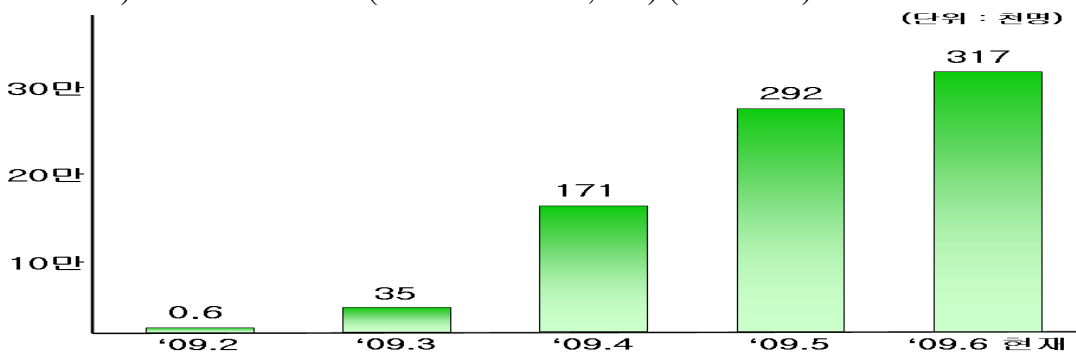
- “Campaign for Public Participation” reported to the State Council('08.7) and launched Nation-wide Green Start Network
- prepared “Promotion and Vitalization Plan for Public Campaign”(‘09.2)

#### ■ Major Points and Results

- Raising awareness of local governments and residents regarding the Green Start Campaign, through the “1<sup>st</sup> climate change week”(4.17~4.26)

- Nation-wide, 75 events (776,000 participants) were held to publicize the necessity and importance of responding to climate change

⇒ Following the event, the results (as the signatories count passing the 150,000 mark) were visualized (as of June: 317,000) (Unit: 1K)



- The “1<sup>st</sup> Greenhouse Gas Diagnosis Week” (6.22~6.27) event was held side by side with the Lights-off event (6.20) and elementary/middle school education, so as to create greater synergies

- with 700 “Green Leaders”, residential apartments and households with elementary/middle school students (total of 25,000 students) were examined using the Green Start homepage (carbon footprint calculator)

※ Lights-off event is held with 3,500 public agencies, and 156 landmark buildings

⇒ Through the promotion of events such as “Greenhouse Gas Diagnosis Week” with local governments, network was established with 174 local governments



■ Expected Results

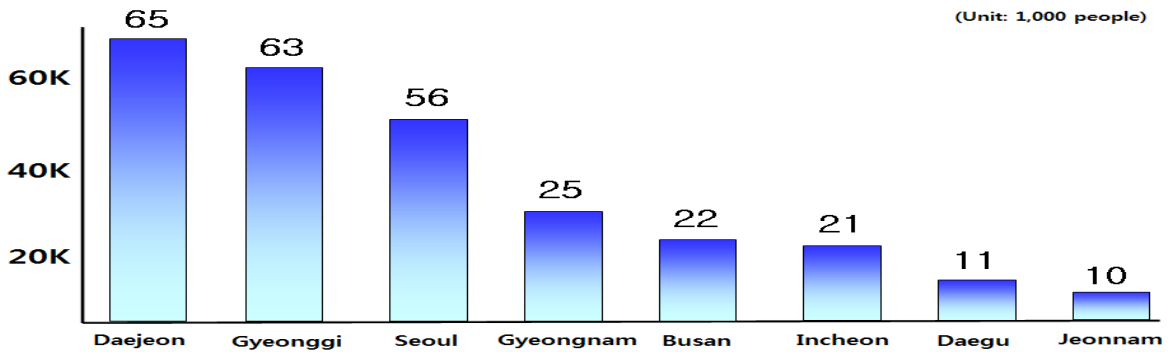
- The Green Start Campaign shall offer opportunities and basis for the rise of voluntary campaigns in local communities, beyond metropolitan areas
- Greenhouse gas reduction in everyday lives (non-industrial sector)

**d. Policy Efficacy**

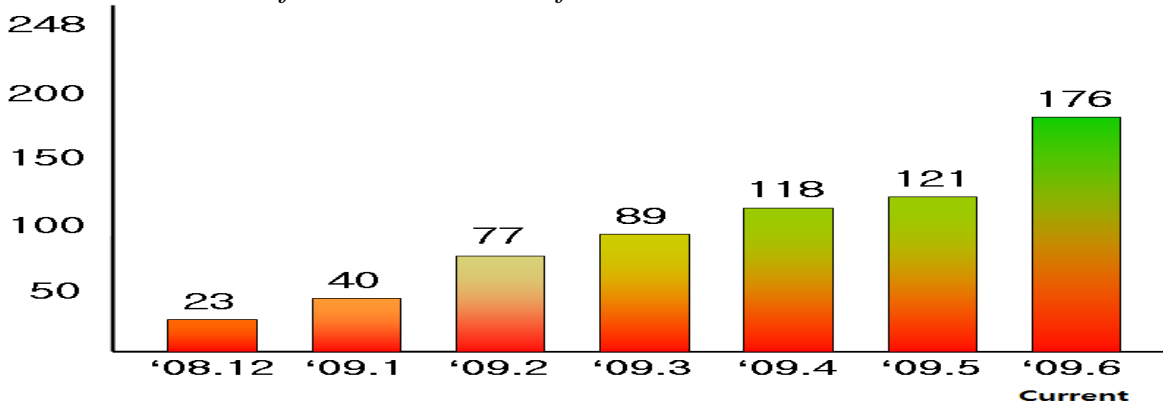
As the result of the Green Start Campaign such as the construction of local networks between local governments and businesses are diffused, the attention of local communities and the media has been focused on the Green Start Campaign through events such as the 1<sup>st</sup> climate change week and greenhouse gas diagnosis, news articles about task development of local governments utilizing the Green Start Campaign, and posted evaluations from civil organizations.

Tangible results include passing 300,000 signatories for greenhouse gas reduction, completing local network establishment at 176 out of the 248 local governments, the public relations effects (educational effect and media coverage) through the promotion of the Green Start Campaign using the carbon footprint calculator, and media exposure in the major newspapers on the greenhouse gas diagnosis of households with elementary/middle school students, along with relevant education such as climate change education and the carbon point system.

< Status of National Participation Covenant for Greenhouse Gas Reduction >



< Status of the Construction of Local Government Networks >



### **e. Challenges Ahead**

To efficiently promote a green lifestyle and the need for greenhouse gas reduction by creating synergies through connecting the Green Life Council activities of the Green Growth Committee and the WE green activities of the Ministry of Gender Equality, a joint campaign will be promoted and a mutual regulation system will be constructed. To achieve the nationwide self-initiation of the Green Start Campaign by vitalizing the local networks, a fundamental base will be constructed through a participant public subscription project and the like, to enable close cooperation between local governments and local networks.

### **f. Future Plans**

To encourage the participation of the general public, a joint green lifestyle campaign will be promoted ('09.7~) through PR activities (both on- and off-line) in 10 areas (homes, workplaces, stores, construction sites, rural communities, roadside, restaurants, schools, campuses, and army bases) through the distribution of stickers, and summer resort publicity activities will be simultaneously promoted.

Furthermore, the promotion results of each local community will be organized and future directions will be devised, while the 2<sup>nd</sup> Green Start National Contest will be held to strengthen green creative activities, including a children's story contest and a composition contest ('09.11).

By posting a list of covenant subscribers by region/organization on the homepage, the construction of networks will be encouraged by inducing competition during the regional policy session (Aug ~ Sep) so as to reach 1 million covenant signatures and complete the construction of a local network of at least 200 local governments ('09.12).

## **3.2 Curriculum development/formal education programs**

### **a. Current Status**

The Republic of Korea has high awareness of the need for green growth, but the connection with actual practice is poor. Practical participation programs and an infrastructure that may encourage self-initiated participation are lacking, and green growth is generally considered to be separate from everyday life.

Accordingly, as a part of green lifestyle promotion, the government is operating diverse education and participatory programs to establish a green lifestyle culture, and is trying to expand these to local communities.

### **Specific Targets**

1. Eco-friendly education environment
2. Operation of education program to raise awareness of green growth

### 3. Spreading a green culture through diverse experience programs

To enable a green lifestyle to be a natural aspect of life from childhood, the base of education must be strengthened so as to cultivate a forward-looking value system, and through the vitalization of intra/extracurricular experience programs and the expansion of participation of households and local communities, the formation of a national consensus can be expected.

#### **b. Eco-Friendly Education Environment**

The “Green School” project, which transforms existing schools into eco-friendly schools, is being promoted in 52 elementary/middle/high schools.

Through eco-friendly improvements such as the formation of green spaces, the introduction of energy-saving facilities, and the use of environmentally friendly materials, the goal is to provide a base for education that supports the emotional and character development of students, and a comfortable space for local residents that further improves environmental awareness.

#### **c. Operation of Curriculum to Raise Awareness on Green Growth**

47 schools have been designated and operated as “Green Growth Research Schools,” at which the relevant curriculum is being developed and offered, and intra/extracurricular experience programs including programs connecting to local communities are being operated. These are shared at meetings to report the results, which in turn further raise the level of green growth awareness.

In addition, elementary school textbooks are now including green growth-related contents, such as information on energy-saving lifestyles, high-efficiency energy, recycled energy, and clean energy, and auxiliary green growth teaching materials are being developed and supplied to build a basis for the operation of a green growth curriculum.

#### **d. Operation of Publicity and Experience Programs for the Establishment of a Green Growth Culture**

For national publicity and to raise awareness on green growth, the Korean government installed a “permanent publicity center” in Seoul, which introduces the low-carbon green growth policies of the government and showcases new green tech products. Along with domestic education facilities and scientific events, showcase facilities related to green growth have been installed, and publicity media clips are played.

For students, green growth experience programs such as “everyday life science class” and “science camp” are being operated, giving them the opportunity to experience green technologies, such as recycled energy. Also, for the general public, green growth continuing

education is being operated, extending opportunities for green education and training citizens to implement green growth in their daily lives.

Also, to extend the campaign to households and the local community, parent volunteer organizations, promotional campaigns, a household carbon dioxide emission reduction program and the like are being promoted, and experience programs are being operated in conjunction with local colleges, research institutes, and environmental organizations to raise general awareness.

#### 4. SCP in national priority areas

##### 4.1 Carbon Labeling

###### a. Overview

To establish a sustainable production/consumption system, reducing carbon emissions for general products as well as energy-consuming products is a necessity. The carbon labeling (carbon mark indication) system is an effective consumer-oriented alternative policy for reducing the carbon emissions of all products and services. Under the system, products must bear a label stating the amount of greenhouse gas emissions produced by the manufacture, transportation (circulation), use, and scrapping of the product, so as to encourage green consumption by customers.

The carbon labeling system includes certification inspection, certification review, and monitoring, and there are two levels of certification provided: carbon emission certification (level 1) and low-carbon product certification (level 2).

###### <Level 1: Carbon emission certification>

- Certified only if carbon emission is disclosed and a greenhouse gas reduction plan is announced.
- Refers to the carbon emission per product



###### <Level 2: Low-carbon product certification>

- Certified only if the product meets the minimum reduction goal
- Refers to products that reduce greenhouse gas



###### b. Actual Implementation

Through the execution of the carbon labeling system ('09.2) and the development of preparation guidelines ('09.2) for calculating the carbon emissions of each product, an operation base for carbon labelling was prepared. Major points include the conclusion of MOUs relating to carbon labeling with 6 major circulation enterprises, so as to advertise

certified products and consumer incentives for the companies. The organization is also providing free education for carbon footprint calculation and certification fee reduction.

As of '09.6, 37 products from 16 companies have been certified, and plans are in place to raise this number to 120 in 2010 and 180 in 2011. Related initiatives that are currently being promoted include the registration of carbon labelling keywords through internet portal sites, showcases for the initial certified products (at 2 government office sites), outdoor promotion of carbon labelling (e.g. through electronic display panels on major buildings), and education for relevant companies and certification targets.

In addition, education about the SPF (Strategic Programme Fund), a matching fund project promoted through an agreement with the British government, is being executed, and the complimentary training and evaluation of the entire certification agency process and theoretical and practical education is being planned.

### **c. Future Plans**

In order to prepare a basis for the vitalization of carbon labelling and carbon emission certification, numerous initiatives are being planned, including the expansion of certification standards for energy-consuming products, the operation of PR booths at various showcases and environmental expositions, the expansion of business agreements with large-scale circulation enterprises to encourage the civil consumption of carbon labeling certified-products, and the preparation of certification standards for low-carbon products in each category.

Furthermore, the promotion of SPF and the international cooperation basis for carbon labelling are being planned through GEDnet.

## **4.2 Promotion Policy for Sustainability Management**

### **a. Background**

As the social impact of businesses is increasing, the demand for responsible role-playing by enterprises increases as well for efficient response to global challenges.

SRI (Socially Responsible Investment) which reflects non-financial achievements of enterprises such as social, environmental, and control structure is quickly growing. Also, various initiatives regarding sustainability management are planned and being expanded at major international organizations. The number of "UN Global Compact"-participating enterprises is growing, and especially the establishment of "ISO 26000" which is an international standard that suggests the responsibilities of business, government, and civil organizations is near.

According to the changes in the environment of global management, securing competitive edge through carrying out social responsibility became a new management tactics for businesses.

### **b. Policy Objectives and Implementation Status**

The fundamental direction of policies for sustainability management is formation of relevant conditions for self-motivated promotion of sustainability management by enterprises. Major policies include governmental rewards to distinguished businesses in sustainability management for raising awareness and extended support. Online self-diagnosis tool was developed to allow businesses to run self-diagnosis on achievements of sustainability management. The businesses with excellent sustainability management results are designated as “environment-friendly business” through screening by the Ministry of Environment, and incentives such as exemption from guidance/supervision are offered. Also, forum and practice manual for socially responsible management of small/mid-sized companies were established.

Secondly, with respect to the legislation in support of sustainability management, the “Industrial Development Act” was amended in 2007 thus stipulating the promotion support for sustainability management, and the sustainability fundamental law and the social business fosterage law were established the same year as well.

Third, trend investigation and research activities are continuously being carried out as well; targeting major enterprises, investigation on ethical management status has been executed annually since 2003, and search for issues about and reaction to global sustainability management is continuously being carried out. Based on the policies of advanced nations and global trend regarding sustainability management, various support policies and expansion plans for upbringing environment-friendly businesses as internationally recognized global green-management brands are being derived, and the amendment of relevant legislation and management regulations are in promotion.

Finally, as response to the standardization of SR (Social Responsibility) by ISO, domestic special committee has been established and operated since 2002, and for examination of standardization plan and collecting various reflections from those in concern, “SR Standardization Forum” was established in 2005.

### **c. Future Plans**

In spite of the late introduction of sustainability management in Korea, relatively various policies are being promoted, and also expanding quickly.

In the future, in order to encourage self-motivated participation of businesses in sustainability management, support for lacking areas such as various cooperation and networking among interested parties, CSR support for small/mid-sized businesses, and CSR

practice in developing nations, and strengthening international activities are in plan. Also, various political methods to promoted environmental management and sustainability management of businesses such as introduction of public announcement system for environmental information and vitalization of green finance supporting environment-friendly businesses are planned.

## < Environmental Management Survey Result('07.6) >

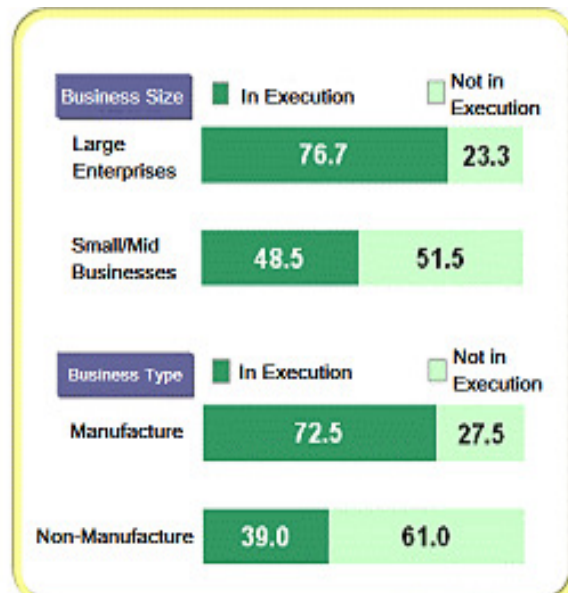
### 1. Survey overview

- Timeline: '07. 6. 1 ~ 6. 30 (1 month)
- Target: Businesses with over 100 employees dealing with environmental issues
- Sample: 430 businesses
- ※ Manufacturing 284 (66%), Other 146 (34%)

### 2. Outcome

#### □ Status of Environmental Management

- Status of the Promotion of Business Management with Environmental Considerations
  - 61% of domestic businesses with over 100 employees were found to carry out environmental operations.
  - Non-manufacturing businesses were found to be promoting environmental management more actively than manufacturing businesses, and large enterprises were found to be promoting environmental management more actively than small/mid-sized businesses.



- Distinguished businesses with environmental management are already exceeding the regulation levels on various environmental metrics in order to achieve long-term environmental competitiveness, based on the **will and support of executives**.

- Major cases include the **publication of environmental performance reports and sustainability reports, the introduction of environmental accounting, the development of eco-friendly products through the application of eco-design at the product design stage, and pioneering activities in the area of greenhouse gas reduction.**
- Major initiatives for environmental management were to improve company image and product awareness (27.0%), to react to the demand of consumers and investors (21.3%), and to reduce environmental cost and improve productivity (16.0%).
  - **Major reasons for not executing environmental management** were found to be difficulty in recruiting relevant/expert human resources (25.7%), difficulty in raising investment/operation funds (23.4%), and lack of political support (15.0%).
- The businesses that executed environmental management responded that for **environmental management measures**, waste reduction (87%) and environment/safety accident prevention (85%) are promoted.
  - As the preparation and response regarding new issues such as greenhouse gas reduction (28%) and the development of environment-friendly products (36%) were found to be low, pioneering efforts to prepare for internationally strengthening environmental regulation appear to be necessary.
- Among **government policies for the promotion of the environmental management of businesses**, the environmental labeling system (90%) and the eco-friendly business designation system (88%) were found to be well recognized, and as one of the means for environmental management, the use of ISO 14001 certification was found to be high.
  - In addition, 82% of the businesses already executing environmental management and 72% of those that were not responded that the importance of environmental management will increase in the future.
    - Only 2% of businesses executing environmental management responded that they planned to decrease the funding estimate ratio of the environmental area.
    - It can be inferred that environmental management will positively influence the competitiveness of businesses in the long run, and it indicates the intention of businesses to actively respond to strengthening environmental regulations.
- To promote the environmental management of businesses, Ministry of Environment has devised an environment-friendly business designation system, supply and dissemination of environmental management methods, and an environmental labelling system.
  - As the importance of environmental operations is expected to grow in the future, efforts to vitalize environmental management are being made through the **preparation of a system to encourage environmental information disclosure by businesses, the development of the environmental consulting industry, and the eco-design support project to promote the production of environment-friendly products.**
  - For the establishment and promotion of effective policies in support of environmental management, regular monitoring would be carried out.



### **4.3 Promotion of Eco-Design Program for Sustainable Production**

Since 2004, the lifecycle inventory (LCI) has been adopted as a way to promote the eco-friendly design of products. As of June 2009, LCIs have been created for 202 items, and these are available to the public at the homepage ([www.kncpc.re.kr/lci](http://www.kncpc.re.kr/lci)). Also, Product Assessment for Sustainable Solutions (PASS), a software that can run LCA by utilizing LCI DB, is developed in order to support the objective and exact evaluation of environmental characteristics.

### **4.4 New Supply and Expansion of Technology in Circulation/Distribution**

#### **a. Background**

The circulation/distribution industry is recognized as a key business that is vital to achieving competitive dominance, especially in today's information-oriented and price-competitive society. To provide the customer with the required amount of goods, at the correct place and time and for the minimum cost, this industry, perhaps more than any other, requires cutting-edge IT, which it actively incorporates.

Recently, to improve the business efficiency of circulation/distribution, within the same brand product, the option of unit purchase has been made available, and the application of Radio Frequency Identifier (RFID) technology, which enables one-touch recognition of all products, is being expanded. In the United States, this technology has been expanded to Wal-Mart and Sam's Club, as well as the Department of Defense and the medical/pharmaceutical industry. In Europe, the standardization of RFID technology and its industrial applications is being executed on a large scale.

Within Korea, the need to develop new services is leading to the systematic development of new RFID technology applications in the area of circulation/distribution, which is expanding Korea's international competitiveness and supporting the introduction of new technology.

#### **b. Policy Objectives and Current Status**

The policies on the supply of new technology for circulation/distribution utilize the RFID industrial vitalization support center as an opening for industrial applications and the introduction of new technologies, and promote the development of new technology for each area of import/export, consumer sales, and retrieval.

Looking at the status of promotion thus far, 52 national standards (KS) have developed around the support center, collecting the opinions of domestic experts and the industry as a fundamental project for the industrial distribution of RFID technology, and a technical training program for improving understanding of technology industrialization and strengthening practical capability was provided to 3,832 people. A particular achievement in

this area was the introduction of RFID management specialist and consultant licenses in Korea. Currently, 388 professionals have been certified, and an international certification center for RFID performance evaluation was established, the 10<sup>th</sup> of its kind in the world, providing a vital service to the industry.

Secondly, to raise awareness for RFID and support supply, the RFID industrialization awards have been held every year since 2006, through which 3 companies have been awarded presidential commendations, and 11 companies have been given commendations by the Minister of Knowledge Economy. In addition, a staff forum was held, in which 120 representatives from major industries participated to raise awareness of new technologies. To support the domestic introduction of RFID, an international conference has been held five times since 2005, providing practical case studies to the industry, guidelines for each industry on RFID introduction and development, and site application showcases for large supermarkets and distribution centers have also been held.

Finally, the development of RFID technology with respect to circulation/distribution classifies the target customers for each key area into small categories, carrying out 4 technological development tasks with the goal of developing the key technologies required in each area. The 4 technological developments are Ubiquitous Global Logistics Platform (UGLP) for import/export, Ubiquitous RFID Environment Collaboration Arena (URECA) for distribution businesses, Ubiquitous Product Lifecycle Unified System (UPLUS) for the management of logistics and the history of products, and Green Logistics Oriented Business Environment (GLOBE), which is a green logistics application based on retrieval.

### **c. Future Plans**

The informatization of the circulation/distribution industry closely connects production and consumption, contributing to Korea's industrial development and economic vitalization. As such, integral technology support and industrialization expansion for the easy and convenient use of RFID technology by the industry will be promoted.

Based on this, an advertisement and support system will be prepared that allows businesses to select and incorporate the key technologies that they need, from import/export to consumer sales, by examining the connection potential of technological developments for each area.

Accordingly, the operations of the leaders' group and staff forum will continue in order to raise awareness, and the relevant infrastructure tasks such as technical force training, licensing system operation, strengthening activities in international standardization bodies, consulting for new technology introduction, and customized training visits will be promoted.

## **4.5 Construction and Operation of Circulation Monitoring and Statistics System**

### **a. Background**

Following the deregulation of the circulation industry in 1996, the industry has been dominated by large circulation companies; this in turn has made operation difficult for small/mid-sized companies in the industry. Recently, due to changes in consumer patterns, new business models such as large supermarkets and convenience stores have grown, while the sales of small/mid-sized companies have dropped dramatically.

In addition, growing business models such as franchise, home shopping, and mail order are suggested as alternatives for strengthening competitive power through franchising and organization, but a statistics system that could monitor the status of the related business is lacking.

Statistics are essential for businesses to establish management tactics and circulation policies. As such, the construction and operation of a statistics system shall be an important fundamental infrastructure for the development of the domestic circulation/distribution industry.

#### **b. Policy Objectives and Current Status**

Once a scientific and information-based knowledge infrastructure is established for the industry, the government can establish effective circulation policies, and businesses can carry out precise decision-making, which will increase productivity on a national level. From this perspective, the major policies for the construction of a statistics system are as follows.

First, for the regular status inspection of small/mid-sized circulation businesses, through a detailed examination conducted every three years of the status, management situation and so forth of the circulation businesses, franchises, and mail order businesses, the “Small/Mid-Sized Circulation Industry Bibliography,” “Franchise Industry Bibliography,” and “Mail Order Business Bibliography” have been published and distributed. Based on the inspection results, motive preparation for policies to support small/medium-sized companies and detailed policy tasks were derived.

Secondly, with respect to the current trend and prospects of small/medium-sized circulation and local circulation companies, the trend and prospects of individual retail businesses in 7 major cities were predicted, through the retail business survey index carried out each quarter. Third, with respect to the database implementation of the status investigation of small/medium-sized circulation businesses, the investigation results were updated through the existing statistics DB.

Fourth, with respect to database integration and the development of a standard database, as various agencies currently formulate and announce circulation-related statistics, to achieve database integration, the standardization of investigation items across all agencies must first be executed. A guideline for statistics investigation methodology was established to raise

awareness regarding the compatibility of statistical information, and further on, the formation of a conference group among circulation statistics investigation agencies was suggested.

### **c. Future Plans**

To improve its utility, the statistical information will be provided online. If all statistics are entered into the database in the same web environment and are utilized in time-series analysis, the productivity and utility of circulation statistics may be expected to improve.

Also, to differentiate from the small/mid-size status investigation project executed every three years, investigation targets will be expanded and examined sporadically each year, so as to provide appropriate and trustworthy statistics on the whole circulation industry.

## **Part II. UPDATED INFORMATION ON NATIONAL FOCAL POINT FOR SUSTAINABLE DEVELOPMENT**

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