

Korea Environmental Policy Bulletin

Korea's National Green Growth Strategy and Environmental Policy

CONTENTS

Summary

I. Introduction to Korea's National Green Growth Strategy

1. Proclamation of the "Low-carbon Green Growth" vision
2. The Green Growth Strategy and Five-Year Plan - A road-map for the Green Growth National Vision
 - 2.1 Green growth investment plan for the next five years
 - 2.2 Expected economic gains from green growth
3. Green technology projects as a key factor in Korea's future green growth
 - 3.1 The 27 core green technologies development plan
 - 3.2 Green IT projects
4. Four Major River Restoration Project in the Five-Year Plan

II. Green growth national strategy and environmental policy

1. Expanding renewable energy use
 - 1.1 Effort to create a market for new technologies in waste-to-energy
 - 1.2 RPS/RFS/FFVs
2. Stricter regulations on auto emissions
3. Emission trading system and energy-related tax system reform
4. Building a green transportation system-activation of public transportation and bicycles
5. GHG emissions cut by 30 percent by 2020

01.
02.

08.

Summary

On August 15, 2008, during a presidential address to celebrate the 60th anniversary of the founding of the Republic of Korea, "Low-carbon Green Growth" was declared as a national vision for the next 60 years.

The "Low-carbon Green Growth" vision aims to shift the nation's growth paradigm from a fossil-fuel-dependent growth paradigm to a quality-oriented growth paradigm with a focus on utilizing new and renewable energy sources and green technologies.

As a road map for the Green Growth national vision, the Korean government presented the "Green Growth National Strategy and Five-Year Plan" to systematically and efficiently promote green growth.

The Green Growth National Strategy envisages three main objectives: (1) to prepare measures to effectively deal with climate change and secure energy independence; (2) to create new growth engines; and (3) to improve quality of life and enhance the profile of the country in the international community.

The Korean government announced that it will invest a total of 107.4 trillion won (US\$ 83.6 billion) over the next five years in green sectors.

The proposed amount of investment in green sectors is 2% of Korea's GDP, which is larger than the UNEP's recommendation. UNEP released in March 2009 a report titled "Global Green New Deal-A Policy Brief" recommending countries to invest 1% of their GDP into green sectors over the next two years to make the global economy green.

To cope with global warming and other environmental problems, Korea will introduce diverse programs such as the expansion of renewable energy use, imposition of stricter auto emission standards, adoption of emission trading system, energy-related tax system reform, and construction of green transportation systems, etc. Further, Korea made an ambitious plan to voluntarily reduce greenhouse gas (GHG) emissions by 30 percent from its business-as-usual (BAU) level in 2020.

I. Introduction to Korea's National Green Growth Strategy

1. Proclamation of the "Low-carbon Green Growth" vision

On August 15, 2008, during a presidential address to celebrate the 60th anniversary of the founding of the Republic of Korea, "Low-carbon Green Growth" was declared as the national vision for the next 60 years. In the address the President of Korea proclaimed that "if we take initiatives and proactive actions with Green Growth, we will be a leader in a new civilization."

Over the past several decades, Korea has experienced an unprecedented level of economic growth which is often called as the Miracle on the Han River. Driven by heavy industries such as shipbuilding, steel, and chemicals in the 1970-80's and automotives, semi-conductors, and the IT industry in the 1990's, Korea is now the world's 13th largest economy. However, several factors such as the climate crisis, global environmental

regulations, and high international energy prices have hampered Korea's growth momentum.

Korea is the 10th largest energy consumer in the world, but almost all of its energy needs are imported from overseas. Despite continuing energy efficiency improvements, CO₂ emissions for Korea continue to increase. Facing such a dilemma, Koreans have started to realize that its low-efficiency, high-energy consumption economic structure is no longer viable against fierce global competition. Thus it is necessary for Korea to adopt a new growth strategy that harmonizes environmental security with economic growth by improving energy efficiency and reducing GHG emissions.

As a national vision for the next 60 years, the "Low-carbon Green Growth" vision aims to shift the growth paradigm from a fossil-fuel-dependent growth paradigm to a quality-oriented growth paradigm with a focus on utilizing clean energy

sources. Korea's "Low-Carbon, Green Growth National Vision" aims to create jobs and new growth engines from green energy and green technologies such as IT, solar cells, bio-energy, high-efficiency fuel cells, advanced light water reactor, etc.

2. The Green Growth Strategy and Five-Year Plan-A road-map for the Green Growth National Vision

Since the "Low-carbon Green Growth" national vision was declared last year, the Korean government presented in July 2009 the "Green

Growth National Strategy and Five-Year Plan" to systematically and efficiently promote green growth. The Five-Year Plan is a mid-term program (2009-2013) designed to implement a long-term strategy for green growth.

On the other hand, Korea enacted the Basic Act on Low Carbon, Green Growth on January 1, 2010, after a series of discussions among experts from the government, political circle, civil society and academia. And the Basic Act has laid the legal foundation to effectively implement the Green Growth National Strategy. These efforts for green growth clearly show the country has a strong drive for the Low Carbon Green Growth vision and the vision is not a stop-gap measure but a future

Table 1. Green growth investment plan for the next five years

Category of policy directions	Investment (U.S. \$ billions)			
	Total	2009	2010-2011	2012-2013
	83.6*	13.6*	37.6*	32.4*
[1] Preparation of measures to effectively deal with climate change and secure energy independence	44.3	6.7	22.7	14.9
1. Mitigation of greenhouse gas emissions	4.4	0.8	1.7	1.9
2. Reduction of fossil fuel use and enhanced energy independence	11.6	2.2	4.4	5.1
3. Enhanced capacity to adapt to climate change	28.3	3.7	16.7	7.9
[2] Creation of new growth engines	22.3	3.7	8.3	10.2
4. Development of green technologies as new growth engines	8.8	1.6	3.3	3.9
5. Greening industry	3.6	0.6	1.4	1.6
6. Advancement of industrial structures	8.5	1.2	3.0	4.2
7. Building a structural basis for the green economy	1.4	0.2	0.5	0.6
[3] Improvement in quality of life and enhancement of the status of the country in the international community	21.7	4.0	8.2	9.5
8. Engineering green land and green transport	19.7	3.7	7.4	8.6
9. Green revolution in lifestyle	1.5	0.3	0.6	0.6
10. Becoming a role model for the international community as a global leader in green growth	0.5	0.1	0.2	0.2

Note : Currency rate (Korean Won / U.S. Dollar) = 1284.7 (June/30/2009)

*Total values exclude overlapping accounts.

growth engine.

The “Green Growth National Strategy and Five-Year Plan” presents the rationale for national low-carbon green growth. The “Green Growth National Strategy and Five-Year Plan” was developed by a wide range of participants from government, industry, academia, and the public at large. The “Green Growth National Strategy” specifies a long-term strategy for the green growth national vision, and the Five-Year Plan is a mid-term plan which will last until 2013.

The “Green Growth National Strategy and Five-Year Plan” includes three objectives, ten policy directions and fifty specific action plans. The Green Growth National Strategy envisages three main objectives. The three objectives are; (1) to prepare measures to effectively deal with climate change and secure energy independence; (2) to create new growth engines; and (3) to improve quality of life and enhance the profile of the country in the international community. Each objective is classified into three to seven policy directions, and a total of fifty core practical tasks make up the ten policy directions.

The Five-Year Plan is a comprehensive roadmap which presents detailed implementation plans for the next five years, and includes yearly policy

objectives and target indicators for the fifty core tasks and investment plans for each of the implementation tasks.

2.1 Green growth investment plan for the next five years

The Korean government has stated that it will invest a total of 107.4 trillion won (US\$ 83.6 billion) over the next five years in green sectors.

Annually, the disbursement is equivalent to 2% of Korea’s GDP.

2.2 Expected economic gains from green growth

The five-year green growth plan is expected to generate production inducements of 181.7-206.0 trillion won (US\$ 141.4-160.3 billion) over the next five years. Annual production inducements amount to 36.3-41.2 trillion won (US\$ 28.3-32.1 billion), which is equivalent to 3.5%-4.0% of Korea’s annual GDP. Furthermore, a total of 75.0-94.9 trillion won (US\$ 58.4-73.9 billion) in value-added production is expected over the next five years.

The Korean government expects that a total of

Table 2. Estimated economic effects of Korea’s five-year green growth plan

	Economic gains					
	Production inducements (\$ billion)		Value-added Inducements (\$ billion)		Job creation (1000 people)	
	Case 1	Case2	Case 1	Case 2	Case 1	Case 2
2009–2013	141.4	160.3	58.4	73.9	1,180	1,469
Yearly average	28.3	32.1	11.7	14.8	236	294
Ratio of yearly average to GDP(%)	3.5*	4.0*	1.5*	1.8*		

* Estimated 2009 GDP = 1,029.5 trillion won (= \$ 801.0 billion)

Table 3. The 27 core green technologies development plan

Green Star Program	① Silicon-based solar cells ② Bio-energy ③ Light water reactors ④ Next-generation fast reactors ⑤ High-efficiency fuel cells ⑥ Integrated Gasification Combined Cycle ⑦ Intelligent infrastructure for transportation and logistics ⑧ High-efficiency light-emitting diodes / Green IT ⑨ Green buildings ⑩ IT-combined electric machines ⑪ Secondary batteries ⑫ Virtual reality ⑬ Green cars
Green Pathfinder Program	① Monitoring and modeling for climate change ② Climate change assessment and adaptation ③ Non-silicon based solar cells ④ Nuclear fusion energy ⑤ Hydrogen energy R&D ⑥ Plant-growth-promoting technology ⑦ Green cities and Urban Renaissance ⑧ Green process technology ⑨ CO ₂ capture, storage, and processing ⑩ Non-CO ₂ processing ⑪ Assessment of water quality and management ⑫ Alternative water resources ⑬ Waste recycling ⑭ R&D in monitoring and processing for hazardous substances

1.18-1.47 million jobs will be created over the next five years. Annually, job creation will amount to 236-294 thousand jobs on average, which is around 26.0%~32.4% of the total unemployed people in the first quarter in 2009.

By following through on the five-year green growth plan, the Korean government aims to create jobs for both skilled and unskilled laborers.

Jobs for skilled laborers will be generated in GHG emissions related sectors such as emission trading systems, emission certifications, green construction, green IT projects, and 27 core technology developments. On the other hand, jobs for unskilled laborers will be created in

sectors associated with the construction of bike lanes, forestation, and several construction projects such as the greening of river basins and small-and medium-sized dams.

3. Green technology projects as a key factor in Korea's future green growth

The Korean government is focusing on the development of green technologies in order to propel Korea forward. Green technologies are expected to settle problems associated with sustainable growth and "growth without employment," enabling both

environmental protection and economic growth by contributing to low-carbon, green growth.

The Korean government plans to continuously increase its investment in green technology because green technology is perceived to be a next generation growth engine. To this end, Korea plans to double its R&D investment for green technologies by 2012 compared to 1.45 trillion won (US\$1.1 billion) in 2008. When these projects are realized, the Korean government expects there will be a remarkable reduction of greenhouse gases, since the green technology development projects will promote the adoption of environmentally-friendly and low-carbon processes in the industrial sector.

3.1 The 27 core green technologies development plan

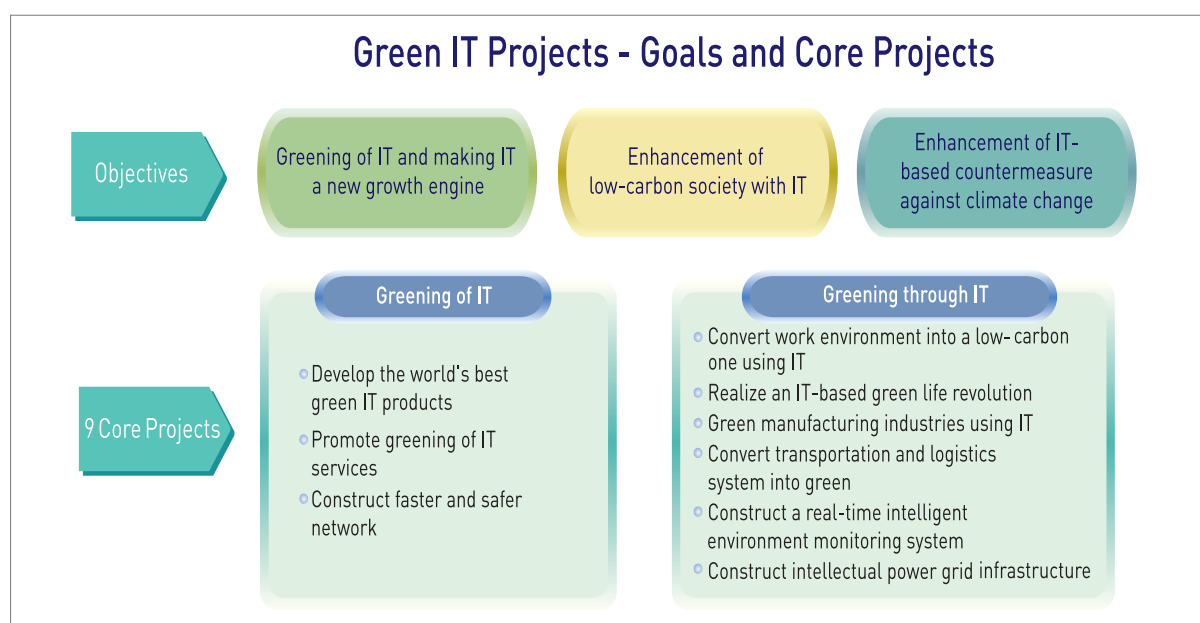
The Korean government plans to select 27 core green technologies in five areas among various green technologies based on their potential

contribution to the nation's economic growth, environmental sustainability, strategic importance, and investment priority.

With regard to R&D investments for the development of 27 core green technologies (GT), the Korean government has comprehensively classified the investments into two programs by considering the degree of need, the degree of greening, the technological impact, and economic performance. The investment direction of each technology was then presented. The two programs announced are the "Green Star Program" and "Green Pathfinder Program".

The GTs included in the Green Star Program include technologies which have the possibility of early commercialization and can provide significant economic benefits over a short to medium-term period. The technologies in the Green Star Program are application-oriented technologies and will be developed mainly by the private sector.

The GTs included in the Green Pathfinder



Program include technologies which provide substantial technical spillover effects and economic benefits over a medium to long-term period. The technologies in this program are, for the most part, new technologies which require research and will help to enhance future technological green growth.

3.2 Green IT projects

To firmly establish Korea as a global green IT leader, the Korean government announced its “Green IT National Strategy”, which contains plans to ▲ make the IT industry more green and encourage new growth areas (Greening of IT), ▲ establish an IT-converged green economy and society, and strengthen abilities to implement countermeasures against climate change (Greening through IT). The “Greening of the IT” sector aims not only to green the sector, but also to increase its future growth potential. On the other hand, “Greening through IT” aims to promote the adoption of a low-carbon society and to strengthen abilities to implement countermeasures to combat climate change using green IT.

With regard to Green IT projects, the Korean government plans to select nine core projects and invest 4.2 trillion won, or US\$ 3.3 billion, over five years until 2013 for the R&D of these core projects. The Korean government expects that 52,000 jobs will be created and that CO₂ reduction will reach 18 million tons of CO₂ by 2013.

4. Four Major River Restoration Project in the Five-Year Plan

Korea’s green growth national vision is a future-oriented and long-term development strategy.

Accordingly, it is unlikely that the vision will be realized in the short term. However, Korea also needs to take short-term countermeasures to overcome current economic problems.

To overcome short-term economic problems and create jobs, Korea announced a “Green New Deal” project by expanding large-scale public investment. By implementing Green New Deal projects, Korea will place investment targets and directions on environmentally-friendly sectors which meet long-term green growth targets.

The Korean Green New Deal Policy is meaningful in that it makes Korea the first country in the world to announce a large-scale green investment plan like the one recommended by the UNEP.

Korea’s Green New Deal policy is included in the Five-Year Plan, and the Four River Restoration Project is the most representative project of the New Deal projects. The Four River Restoration Project is one of the 50 core tasks included in the Five-year Plan. The main part of the Four River Restoration Project is to restore four major Korean rivers - the Han, Nakdong, Geum and Yeongsan - by investing 22.4 trillion won (US\$ 17.4 billion).

The Four River Restoration Project is a large-scale public investment project that effectively contributes to green growth over the long term and job creation over the short term. The Project aims to; ① secure water resources; ② prevent floods and droughts; ③ improve water quality and restore their water ecosystems; ④ develop leisure spaces through the development of the rivers and river basins; and ⑤ develop the regions around the rivers.

II. Green growth national strategy and environmental policy

The bottom line of Korea's green growth strategy is pursuit of sustainable economic growth and economic/environmental harmony. Hereafter, the environmental policies planned to promote green growth in Korea will be introduced briefly.

1. Expanding renewable energy use

Korea is dependent on overseas sources for 97% of its energy needs. Thus, the top priority for any low-carbon green growth policy should be to reduce the dependence on fossil fuels and energy imports.

To overcome Korea's dependence, the government plans to take firm actions to reduce the use of fossil fuels and to enhance the supply of new and renewable energy sources such as those from waste and bio mass. According to the Five-Year Plan, Korea will increase the share of new/renewable energy to 3.78% from the current share of 2.78% (2009). Korea will invest a total of 5.63 trillion won (US\$ 4.38 billion) by 2013 in the sector.

1.1 Effort to create a market for new technologies in waste-to-energy

The production of renewable energy will be centered on waste-to-energy projects and biomass-to-energy projects. As part of the waste-

to-energy projects, Korea plans to construct; ① 14 Environment Energy Towns broadly divided into four themes by 2020; ② 48 plants for refuse-derived fuel (RDF) production (14,000 tons/day) and biogas production to produce energy from 3.86 million tons (33% of the available volume) of organic waste by 2013; and ③ 200 new/renewable energy villages and 600 low-carbon green villages by 2020 mainly in rural areas and small cities. Furthermore, Korea plans to elevate the recycling rate to 90% by installing 94 livestock waste recycling facilities and to produce 2.70 MW of electricity a month (equivalent to a month's electricity use for 9,000 rural households) by installing 15 livestock-waste-to-energy stations by 2013.

Moreover, Korea also plans to produce 2.27 million m³ (equivalent to 20% of estimated use of gasoline of 11.4 million m³ in 2020) of bio-ethanol by developing marine forests (7,000 ha) and seaweed farms (500,000 ha) along the coast by 2013 and 2020, respectively.

As a short-term measure to promote Waste to Energy (W2E) generation, the Ministry of Environment came up with the Waste to Energy and Biomass Energy Plan, which consists of the following policy tools; combustible W2E conversion; organic W2E conversion; and recovery and utilization of landfill gas and waste heat from incineration. According to the statistics provided by the government, these measures are expected to create approximately 2.9 trillion won(US\$ 2.25

billion) economic value added (EVA) and reduce 9.16 million tons of CO₂.

1.2 RPS/RFS/FFVs

To expand the use of renewable energy, Korea plans to adopt new policies such as the Renewable Energy Portfolio Standards (RPS) and Renewable Fuel Standards (RFS). In 2012, Korea will introduce RPS, which will mandate that utilities increase the supply of renewable components to 10% by 2020.

Through RFS, Korean transportation fuel suppliers will be obligated to provide bio energy such as bio-diesel, bio-ethanol, and bio-gas for automobiles. The policy will make it mandatory for fuel suppliers to provide 3% of transportation fuel from bio-diesel from 2012 and to increase that share to 7% by 2020. To create a market for bio-fuels for the automobile sector, the Korean government plans to develop and commercialize Flex-Fuel Vehicles (FFVs).

2. Stricter regulations on auto emissions

The Five-Year Plan requires cars to increase their fuel efficiency. To advance in green car development, Korea plans to raise the bar for auto fuel efficiency and greenhouse gas emissions above current U.S. standards. From 2012 to 2015, cars should be designed to either drive 17 kilometers per liter or cut greenhouse gas emissions below 140 grams per kilometer.

Korea currently has an average fuel efficiency of 11km per liter and emissions of 210 grams per kilometer. The new standards unveiled by the U.S. in May would raise average fuel efficiency standards for all new passenger vehicles to 35.5 miles per gallon by 2016, the equivalent of 15.1 km per liter. Korea will apply the new fuel efficiency and emission rules to 30 percent of cars sold by automakers in 2012, increasing that amount to 60% (2013), 80% (2014) and 100% by 2015, respectively.

The Korean government expects that strengthened regulations will accelerate technology development for low-carbon and high efficiency cars such as hybrid cars, clean diesel cars, and electric cars. The government plans to increase Korea's market share of hybrid cars (from 0.2% in 2008 to 3.9% in 2013) and clean diesel cars (from 0% in 2008 to 5.1% in 2013) in the world market. Korea is the world's 5th largest auto-producing country, producing about 3.80 million vehicles in 2008, of which about 2.70 million vehicles were exported to foreign countries. For that reason, Korean cars are greatly affected by the legal requirements of export destinations such as Europe and the United States. Also, Korean automobile industries employ 10.3% of the total employed people, or 1.63 million people (as of 2007), directly or indirectly.

The transportation sector in Korea accounts for about 19.3% of national energy consumption and 17% of total national greenhouse gas emissions. The Korean government expects that this policy will

reduce greenhouse gas emissions by about eight million tons by 2015 and 25 million tons by 2020.

Also, the accumulated savings from the curbed use of oil products is expected to be 15 million barrels by 2015 and 42 million barrels by 2020.

3. Emission trading system and energy-related tax system reform

To promote GHG reductions effectively, the Korean government is going to introduce an emission trading system and try to enact energy related tax reforms. The Korean government plans to provide legal and institutional devices for the implementation of an emission trading system

Thereafter, the government plans to operate the system on a trial basis and then, after considering the results of the pilot program and international GHG trade-related negotiation trends, phase the system in. According to the Korean government, Korea's scale of GHG emission trading will reach about 0.5 trillion won (US\$ 0.39 billion) in 2013 and about 2 trillion won (US\$ 1.56 billion) in 2020.

OECD countries have increased energy taxes since the 1990s as a countermeasure against climate change. Due to the possibility of being assigned as a GHG mandatory reduction country, Korea also needs to strengthen the environmental aspects of the energy taxation system. For this reason, the Korean government plans to gradually convert the current energy-related taxation system into an environmentally-friendly taxation system while considering effects on the domestic economy and reflecting international taxation

reform trends.

Consequently, the Korean government will increase financial supports that utilize environmental tax revenue so that low-income earners and the energy-disadvantaged group's energy welfare will not be affected by energy tax reforms. Also, the government plans to expand financial support to improve the deteriorating energy facilities of low-income households into energy efficient facilities.

4. Building a green transportation system-activation of public transportation and bicycles

Korea plans to push for improved green transportation policies increasing the modal share of rail and inducing the activation of environmentally-friendly modes of transportation in metropolitan areas in order to reduce emissions in the transportation sector. The Korean government plans to increase the share of rail from the current level of 18% to 22% in 2013.

Also, the government plans to increase the share of public transportation in metropolitan areas from 50% to 55% in 2013.

Furthermore, the government plans to boost bicycle use in the transportation sector by increasing the share of bicycles from 1.5% to 5% in 2013 by connecting the use of bicycles with other means of public transportation. Specifically, the Korean government plans to; ① introduce a public rent-a-bike project; ② expand connecting systems for bicycles and public transportation by expanding the bicycle shed system at public transportation transfer points; ③ expand bicycle

loading facilities on trains and buses; ④ construct 1,728km of new bikeways along four rivers; and ⑤ build a nationwide bikeway network similar to the one in Europe. The government will include the installation of bikeways in future urban planning projects when establishing new town developments, and revise related laws to reform the urban structure toward “Compact City”, where workplace is adjacent to residence, in order to boost bicycle use and reduce the time it takes to commute.

5. GHG emissions cut by 30 percent by 2020

Korea made an ambitious mid-term greenhouse gas (GHG) mitigation target. Korea decided to voluntarily reduce greenhouse gas emissions by 30 percent from its business-as-usual (BAU) level in 2020. The target level is an ambitious one in that it is the highest level recommended by the Intergovernmental Panel on Climate Change (IPCC) for developing countries. The final decision for mid-term target for greenhouse gas emissions reduction for Korea was approved at the cabinet meeting on Nov. 17, 2009.

Considering the importance of building wide stakeholders’ consensus, Korean government launched a national consensus-building process

to decide a mid-term GHG mitigation target. The consensus-building process included collecting public surveys, getting consultations and public hearings from various stakeholders.

With the commitment to the target level, industries are urged to find the ways to cut GHG emissions because there will be difficulties for industries to achieve it in a short period of time. The government and private industrial sector will continue to work together to cope with damage that will be brought to industrial competitiveness. In initial stage, the government will take lead in reducing GHG emissions from the non-manufacturing sectors such as building, housing, and transportation sectors which have much room for reduction. As mentioned earlier, in the Five-year Plan for Green Growth, Korea already made a roadmap to cut greenhouse gases by adopting new energy-saving technologies and by expanding the use of clean energies from various sources.

Now, Korea is the first emerging country to set up a GHG emissions reduction target voluntarily. Currently Korea is a Non-Annex 1 country. Korea’s GHG emission reduction target is not an internationally binding one but a voluntary and unilateral target. Korea hopes that the GHG emissions reduction plan would enhance its efforts to shift the economy to green.

Published by

- **Ministry of Environment**

Government Complex Gwacheon, Jungangdong 1, Gwacheon-si,
Gyeonggi-do, 427-729, Republic of Korea
Tel. (822) 2110-6552 Fax. (822) 504-9206

- **Korea Environment Institute**

290 Jinheungno, Eunpyeong-gu, Seoul, 122-706, Republic of Korea
Tel. (822) 380-7777 Fax. (822) 380-7799

- **Written by Dr. Sang-Cheol Shin (KEI)**



ISSN 1976-6246