

Low Carbon Green Growth Strategy of Korea



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1. Why Low Carbon Green Growth?

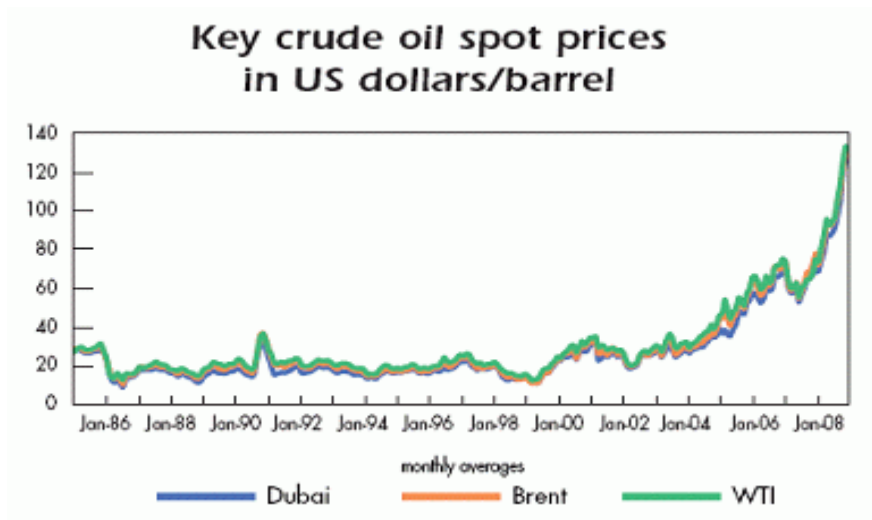
1.1. Green Race is on going!

The world is now facing resources including energy and environmental crisis caused by climate change(global warming) and high oil prices. If the current high energy consumption pattern remains unchanged, a possible economic loss caused by climate change is projected to reach 5 to 20% of the annual global GDP according to the Stern Report, which is published in 2006. According to the report, 2°C rise in a global temperature would make 15 to 40% of Wild Fauna and Flora extinct, 3 to 4°C rise would lead to relocation of over 2 billion people, respectively.

As BRICs along with China and India, two of the world's most populous countries aggressively drive forward economic development, demand for energy and resources is soaring with limited supply ending up with worsening "Global Imbalance"; While the surge in global population will continue into the next 30 years (6 billion in 2000 to 8.2 billion in 2030) the available natural resources are limited (Table 1), resulting raising the price as shown in Figure 1.

<Table 1. The Available Reserves of Natural Resources>

Natural resources	Availability(years)
Oil	40-43
Gas	58-62
Copper	28



In addition, Per capita supply of fresh water will decrease by one third within 25 years, worsening water shortage as well as increasing desertification and food crisis; As the increase of GHG emissions continues, a third of Asian farmland will be desertified

(27% of the Chinese territory).

Countries and global leaders show mixed reaction facing the era of energy and climate change crisis. That is, they emphasize resource saving and environment protection to enhance their national competitiveness while competing to secure more resources and energy. Developed countries start to consider green industry and green technology as new growth engine and focus their efforts on these fields (Green Race);

- **U.S.A:** President Bush mentioned climate change will be high on the agenda of the next administration. The new administration is projected to shift its policy direction toward green growth such as renewable energy in a positive way; in the US presidential election, Democratic presidential nominee Barack Obama pledged to focus his effort to develop renewable energy and create 5 million more jobs by investing 150 billion dollars, and Republican presidential nominee John McCain pledged to make all new buildings zero carbon emission by 2025.
- **UK:** the British government exerts their utmost efforts to secure renewable energy by investing 207 trillion by 2020.
- **Germany:** The German government commits to create 0.5 million more jobs in the renewable energy sector.
- **France:** the French government achieves zero consumption of fossil fuel in power plants (Nuclear plant 79% is already secured).
- **Japan:** Through "Innovation 25(May, 2007)", the national long term strategic direction, Japanese government adopted strategies with which environment is utilized as an engine for economic and national growth; By raising 10 billion dollars' worth of fund, for the next 5 years, it plans to adopt "Cool Earth Partnership", a financial supporting program for GHG reduction projects of developing countries. A plan for reducing green house gas(GHG) by 80 % by 2050 underlines Japan's intention to take the lead in the global market based on its world's best energy technology.
- **G8(Toyako, Japan, July, 2008):** "Climate change and clean energy" was at the top of the agenda in G8 Summit meeting.

- **Dabos Forum:** "Climate change" has been presented as the main agenda for 3 consecutive years.

Due to rising prices and natural resource depletion, input driven economic growth is harmful to environment and becomes economically infeasible one. With the soaring prices of natural resources and energy, economic structure heavily dependent on natural resources and energy becomes inefficient hindering further growth. As global warming progresses, it is highly plausible that low carbon economy is forced to be implemented by international regulations; As negative impacts caused by global warming unfold, international cooperation and regulation is inevitable for the sake of the survival of human kind and economic growth. Low carbon and environment friendly industry are widely perceived as a strategic industry generating new growth momentum.

As climate change and energy crisis get worsen, green markets such as GHG emission trading and new or renewable energy are expected to be rapidly expanded; the volume of GHG emission trading market is expected to increase from 64 billion dollars in 2007 to 150 billion dollars in 2010.

GHG emission trading market:

The market based on international regulation such as Kyoto Protocol, is projected to grow further under post Kyoto protocol where the U.S. is expected to sign in. It consists of allowance-based market and project -based market.

- *Allowance based market: a market where surplus allowance can be traded to cover allowance deficit after GHG emission allowance is allocated to a company*
- *Project based market: a market where emission allowance gained from GHG reduction project is traded*

□ A market for new and renewable energy such as wind power, solar power, biomass and hydrogen fuel cells is expected to expand to 254.5 billion dollars in 2017, a three time increase compared to 77.4 billion dollars in 2007.

1.2. Korea Status

□ As the world's 10th largest energy consumer, Korea is heavily dependent on energy imports. Greenhouse gas emission in Korea, on the other hand, is continuing to grow. As of 2005, Korea's total emission amounted to 591 MCO₂eq. Considering Korea's current volume of GHG emission, the Korean economy could suffer if Korea participates on the global effort to address climate change; The volume of GHG emission is still on the rise with the economic growth, Korean economy will inevitably encounter unfavorable condition.

□ Due to intensive economic activities with limited natural resources, Korea faces a rapid reduction of green environmental resources along with water shortage and contamination, soil contamination and ecological resource reduction ending up with higher social cost to receive ecological services. Korea seeks a new growth engine for opening the era of GDP per capita of 30,000 to 40,000 dollars and worsening jobless growth and social disparity.

<Table 2. The key industry of Korean economy per era>

1960's	1970's	1980's	1990's	2000's
Textiles, Plywood, Wiggery	Steel, Machinery, Chemical	Car, Electronics, Shipbuilding	Semiconductor, Computer communication equipment	?

□ A new approach, which promotes economic growth with less carbon emission is required to turn crisis into opportunity. The fact that Korea is the world 10th largest energy consumer can increase chances to secure domestic market for GHG emission reduction. Technology for GHG emission reduction and investment in eco friendly industry create jobs and a new market. Korea has unlimited potential since it has the world's best technology in the industries related to green tech such as IT and semiconductor industries and its technology is only 5 to 10 years behind those of advanced countries. A market for new and renewable energy such as wind power, solar power, bio-mass and hydrogen fuel cells is expected to expand to 254.5 billion dollars in 2017, a three time increase compared to 77.4 billion dollars in 2007.

2. What is Low Carbon Green Growth?

2.1. President's speech on the 63rd anniversary of national liberation

“Marking the 60th anniversary of national liberation, today, I'd like to present low carbon green growth as a new axis. Green growth refers to sustainable growth which helps reduce GHG emission and environmental pollution.”

“It is also a new national development paradigm that creates new growth engines and jobs with green technology and clean energy.”

2.2. The Concept of Green Growth

It breaks away from the view that there is contradiction between environmental protection and economic development. It is a virtuous cycle of development where environmental conservation leads economic growth, and vice versa.

① **(economy ⇒ environment)** : economic growth that improves the environment, not degrades it. (*Containing concepts of minimizing environmental overloads (CO₂ emission) and using energy and resources effectively*)

② **(environment ⇒ economy)** : economic growth that regards environment as a new growth engine

① is a prerequisite for ② : ① → ② → ①' → ② (a virtuous cycle).

It is an action plan to realize the vision of sustainable development and not a concept separable to sustainable development. Green growth is a comprehensive and open-ended concept encompassing new culture, change and paradigm. It moves away from an attitude that only pursues economic efficiency to an eco-efficiency that enhances both the environment and economy.

2.3. What is Eco-efficiency?

Enhancing environment economic efficiency through reducing cost and environmental impact per performance

- **Cost** : Reducing cost for companies to comply with regulations by optimizing regulations through integrated policy measures (Regulation, inducement, support) to eliminate overlapped policy measures
- **Environmental impact** : Reducing total environmental loads and impact by setting performance rating in the rating index and adopting and enforcing implementation measures

Reducing regulation cost

- Adopting product based environmental index instead of policy based one --> Resolving regulation overlapping issues.
- Developing and managing environmental and economic efficiency index for international environment regulation/global environment protection --> Reducing regulation cost for companies

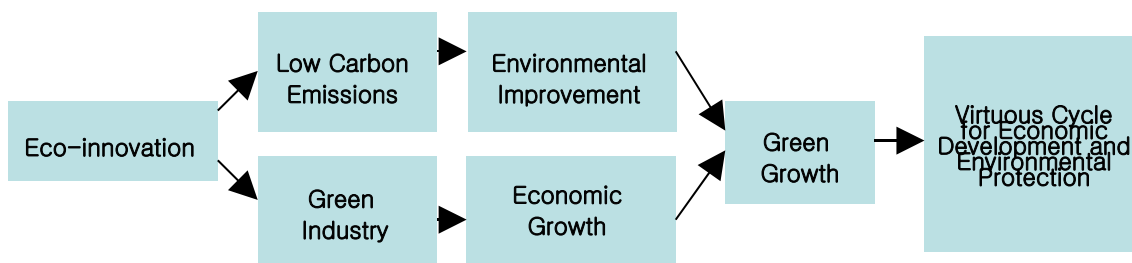
Reducing environmental impact

- Regulating anti environmental products(individual index) and developing eco friendly products(multiple index) by establishing performance rating index (insufficient / excellent), preparing and implementing its action plan --> Effective management of environmental overload and impact at the national level

Establishing technology development and support system for higher environmental economics efficiency

- Integration of resource technology development, distribution, rating methods for process assessment, DB establishment, eco design, eco friendly product supply chain management and eco friendly components/materials network --> Enhancing national and industrial competitiveness of environment

Green growth, based on low carbon emissions and green industrialization, is a concept for new growth in order to further economic growth



2.4. Three Axes of Green Growth and Its Goals as an Action Plan

1 Minimizing energy and natural resources consumption while sustaining a solid growth

- Restructuring industry toward low energy consuming one (Shifting focus from manufacturing centric to knowledge services centric industries)
- Enhancing efficiency of energy conservation and consumption
- Implementing Policy to enhance ecological efficiency

② Minimizing environmental loads such as CO₂ emissions without energy or natural resources transition

<Table 3.GHG emission volume per GDP (unit: CO₂ ton/ GDP thousand dollar,05')>

Korea	U.S.	Japan	China
0.469	0.529	0.350	0.633

- Expanding renewable energy distribution
- Developing clean energy such as nuclear energy
- Restricting CO₂ emission
- Establishing low carbon and eco friendly infrastructure
- Encouraging consumers to purchase green products

③ Developing green industry as a new growth engine

- R&D investment for green technology
- Fostering green industry such as renewable energy and promoting export oriented industrialization of its products

- Providing supports to pioneer the global market

3. Policy Direction for ‘Low Carbon Green Growth’ of Korea

3.1. Objectives and fundamental structure of Green Growth

□ Green growth, a comprehensive national vision, encompasses not only energy and environment issues but also job and growth engine creation, corporate competitiveness, land planning and life style reforms. It also contains objectives and action plans of our society and economy as well as international society to take another big step forward and emerge as a hub of the world.

□ Green Growth is a national vision for the future which can bring multiple benefits: new national growth through new growth engine; higher quality of life and environmental improvement; and contribution to global efforts to tackle climate change.

<Green growth can be achieved through specific measures of three axes>

<i>New growth engine</i>	<i>Higher quality of life and environmental improvement</i>	<i>Contribution to international community</i>
<ul style="list-style-type: none"> - Low carbon policy to reduce GHG - Green technology as new growth engine - Technology convergence policy - New green job creation - Higher corporate competitiveness 	<ul style="list-style-type: none"> - Improvement of land, urban planning, construction, and transport - Life style reform - Green education & culture policy - Eco-friendly taxation reform 	<ul style="list-style-type: none"> - Overseas policy for higher national status - A bridging role between developed and developing countries

3.2. Green Growth Action Strategies

New national growth through new growth engine

□ (1) *Green growth as a new growth engine*

□ Pursuing economic growth by adopting green growth, green technology as a new growth engine to reduce GHG and enhance environment friendliness is to be developed. Through scientific studies on renewable energy and developing greenhouse gas mitigation technologies, government R&D investment will be significantly boosted. About 5 trillion KRW will be injected in a five-year period from 2008 to 2012, more than doubling the investment size of 700 billion KRW (as of 2008). Also, convergence green technology will be promoted using Korea's strength in IT, BT and NT.

□ ***(2) Development and export-oriented industrialization of green industry***

Green industry, such as renewable energy and CDM, will be fostered as new growth engine for the growth of national economy. The government plans to increase exports, distribution and support for renewable energy such as solar, wind, hydrogen fuel cells. The share of renewable energy in total energy portfolio will also be raised, from 2.24% in 2006 to 4% in 2012 to more than 11% by 2030 and over 20% by 2050. Renewable energy industry, which is expected to create more employment, is expected to create around 100,000 jobs by 2012 and around 950,000 by 2030.

One million “green homes,” which are eco-friendly, low energy consuming homes dependent on renewable energy, will be created by 2020. Renewable energy sources used here will vary according to house type and regional conditions.¹ “Solar Town(s),” in which electricity generated from solar energy supplies the lighting systems of individual homes and public facilities, will be created.

□ ***(3) Developing energy efficient technology and eco friendly industry***

R&D investment for developing technologies to improve energy efficiency will be expanded, particularly in electricity IT, LED lighting and energy storage. The foundation will be laid for the growth of LED (light emitting diode) industry by implementing measures such as creation of regional “LED convergence specialized clusters.” Initially, the demand for LED will be created in the public sector and gradually, support will be provided to existing lighting businesses (incandescent and fluorescent lamps) to transition to LED.

¹ Photovoltaic 4,136,000 homes, solar thermal 292,000 homes, geothermal 292,000 homes, hydrogen fuel cell 42,000 homes

The production of hybrid cars and fuel cell cars will be spurred to place Korea among the world's major four "green car" manufacturers. By 2013, energy efficiency of newly manufactured automobiles will be improved by 30% compared to existing vehicles. Energy efficiency of major energy-intensive industries such as steel and petrochemicals will be improved. Various measures to improve energy efficiency will be employed such as; obligating large energy-intensive enterprises to receive energy review, developing energy service companies (ESCOs) and expanding the application of minimum energy efficiency standards.

Globally competitive companies specializing in water management will be nurtured to promote overseas market penetration in fields such as wastewater reuse and sea water desalination. In addition, the number of waste-to-energy facilities will expand from three to 57, which translates into 14,160 tonnes per day, in the period. Landfill-gas recovery and heat recovery systems will be also reinforced. A CDM project support organization will be operated to provide export-oriented services such as consulting on overseas market access strategies and assistance for negotiation and contract process. As of August 2008, there are 19 Korean CDM projects registered in the UN, equivalent to 14.6 MtCO₂eq/year.

□ ***(4) Transition to low carbon industry and Job creation***

□ Combating climate change and energy crisis, transition to low carbon and knowledge intensive industry from energy consuming or input-driven industry is very crucial. Fostering knowledge service industry such as cultural contents, strengthening support for and expanding energy management system distribution is to be expanded.

Environmental improvement projects such as promoting renewable energy and energy efficient industry and creating forest can provide a solution to "Jobless growth" by creating larger number of jobs than conventional industries. For instance, solar energy sector can create 7 to 11 times more jobs than conventional industry. Turning 31% of usable waste into energy sources by 2012 is expected to lead to creation of 17,000 new jobs and 1.3 trillion KRW in economic profit.

Quality of life and environment improvement

□ (1) *Improving social fundamentals and creating low carbon green environment*

Increasing eco-efficiency and social system improvement such as forest creation, urban planning, construction and transportation will improve quality of life. Upgrading air quality, promoting ecological zones and implementing eco friendly land and city plans integrated with energy, transportation and land use will also enhance urban competitiveness. Compact-style new cities and villages promoting carbon cycle in rural areas are to be promoted.

Costs incurred due to traffic congestion will be substantially cut to contribute to emission reduction efforts while upgrading the quality of life. Measures to cut passenger car use and promote public transit will be employed such as imposing a greater traffic congestion tax and improving parking conditions. An environment favorable to non-motor, green vehicle users, such as bicycle riders, will be created. More investment will be made to expand public transportation networks between cities in the metropolitan area and promote use of public transit such as LRT and subways.

CO₂ monitoring system in buildings and the construction of green home will be expanded. A wide range of measures are to be implemented to reduce energy consumption and resources use. These include; selection of eco-friendly location of buildings, using natural lighting, eco friendly materials and renewable energy and enhancing insulation

□ Furthermore, to reduce the generation of solid waste, various measures including lighter packaging and waste wood recycling will be promoted. The “waste-to-resource” ratio will be increased from 1.7% at present to 31% by 2012. Carbon sinks of forests will be expanded and the carbon cycle will be facilitated.

Comprehensive and sectoral climate impact assessments and adaptation measures at the national level will be established. Risk management systems, disaster prediction and health measure for the most vulnerable will be significantly improved. Eco-friendly water recycle systems will be restored and water facilities will be newly constructed or

expanded. Emergency relief and rescue plans will be strengthened and safety awareness will be raised.

□ ***(2) Promoting Green life style reform***

Realizing a low carbon society, active participation of the public in climate action is required. To this end, “green culture” and “less carbon” life style will be widely promoted. Encouraging children to understand and adopt low carbon green growth concept, it will be introduced into regular curriculum and its experiential learning and public awareness programs are to be presented.

Consumer responsibility on the environment and commitment to act on the issue will be enhanced through campaigns launched on various media channels, such as television and the Internet. Green consumption will be promoted by increasing the supply of green products, strengthening environmental information disclosure and applying a GHG labeling system that indicates achieved emission reduction of a product. On top of this, a nationwide movement toward a low-carbon society will be pursued, using private-public networks.

Contribution to international community's efforts

Korea will assume the bridging role between developed and developing countries to encourage active participation of both parties into the global climate change regime. Emerging as a green hub in East Asia, Korea's expertise in reforestation and environmental improvement will actively transfer to developing countries. Through launching of the “East-Asia Climate Partnership,” Korea will more contribute to the global community. The 200 billion KRW of new resources will support developing countries climate action for 5 years. It consists of policy exchange (East-Asia High Level Forum), technology exchange (Climate Technology Fair), investment promotion (Carbon Finance Fair) and technological support.