

Yang, Jichung

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Strategies for Low-Carbon Green Growth and Urban Management in Korea

Jichung Yang

Professor, Institute of Economic Research, 16 Dong -523, Seoul National University, Korea; Tel: +8228823178; Fax: +8228884454; E-mail: jcyang7@chol.com, jcyang@snu.ac.kr
President, Global Economy and Industry Institute, Seoul, Korea

ABSTRACT. National policies and strategies for low-carbon green growth in Korea are reviewed in this study. Providing standards and guidelines for urban comprehensive planning and management plans is necessary so that the series of plans can deal with possible effects from climate changes. Urban planning guidelines for management and improvements to achieve low carbon green growth were set up and implemented, focusing on institutional and regulatory foundations. These deal with climate change influences on urban planning, reduction of green house gas emissions and elevation of energy efficiency based on plans of land use units. In the case of Seoul city, transit-oriented compact development, public transportation-oriented structure, green space expansion, and pleasant living spaces are implemented in relation to urban structure and land use. We should suggest systematic and comprehensive countermeasures against greenhouse gas emissions and climate changes in terms of spatial structure, transportation systems, natural resource conservation, environment management, energy and open spaces. For the Seoul mega-city, plans show the capabilities of the policy department including many policy tools. Reflecting smart city, ubiquitous city, and U-Eco city concepts and human behavior, we should move towards increasing efficiency and maintaining sustainable economic growth.

KEYWORDS. *Low-carbon green growth, urban management, Korea, Seoul*

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1. INTRODUCTION

The old paradigm of “brown growth” that was dependent on exploitation of imported cheap fossil fuels and other natural resources, but largely disregarded the problems of quality of growth such as climate change, environmental degradation and social inequities, was failing. Green growth showed the new way for the future as well as the present. It is a policy that emphasizes environmentally sustainable economic progress to foster low-carbon, socially inclusive development. The social dimension of development that is inclusive of social inequalities and development is also important. In this study, national policies and strategies for low-carbon green growth in Korea are reviewed. Also in the case of Seoul, policies in relation to urban management and planning for green growth will be introduced and evaluated.

In Korea, the national plan is to build a comprehensive territory management system for major ecological resources including rivers, mountains and seas. Scientific management of water resources will keep in mind climate change, reinforcing disaster prevention capabilities and creating sustainable and safe territories and living spaces. The other important strategy is to build cities and residential environments where people can enjoy high quality and culturally rich lives. The details include creating Korean-style green and compact cities suitable for the era of green growth, regenerating urban areas and having attractive cultural spaces. Other plans include improving housing quality, upgrading housing safety, providing energy-saving green homes and reorganizing existing zoning. Green transportation systems are also designed to meet green growth criteria. The Korean government is focusing on railways, marine transport, alternative automobiles and walking and biking (Presidential Committee on Green Growth, 2009a, 2009b). In general, much time is spent on making plans but much less time on feedback about them. Plans for the Seoul mega-city show the government failure possibilities and the capabilities of the policy department including many policy tools. We draw some policy implications for urban management in relation to a low carbon society. Unrealistic policies should be changed. In case of realistic planning and forecasting, applied technologies that meet the needs and demands are important.

2. National Policies and Strategies for Low-Carbon Green Growth

Korea has achieved remarkable economic growth, especially coming from exports, technical changes and progress after the Korean war (Romer, 1990). The Korean government has been pursuing green growth in a comprehensive and vigorous way since 2008. This is shown by the Presidential Committee on Green Growth that was launched in February 2009 as the highest body for consultation and coordination of the relevant issues and policies. It consists of 14

ministers and 36 private experts and is co-chaired by the Prime Minister and an appointed civilian chairman, meeting in the presence of the President (Figure 1). It reflects the importance of mitigating climate change and its impact on the nation and cities (Rosenzweig, et al., 2008).

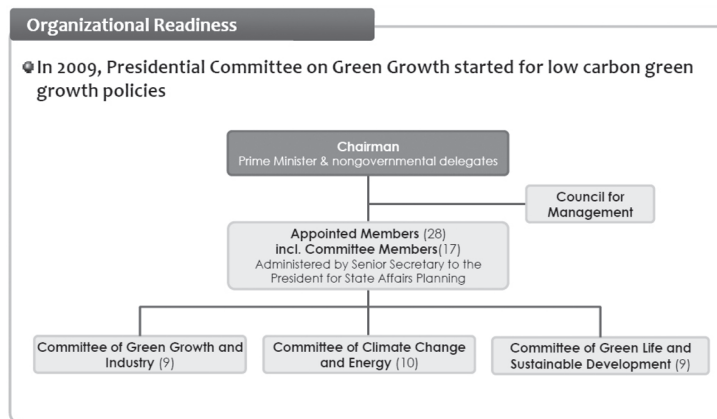


Figure 1. Presidential Committee on Green Growth

In 2009, this Committee prepared and released the National Green Growth Strategy, a long-term blue print for green growth through 2050, as well as the Five-Year Plan for Green Growth for annual implementation of the strategy through 2013. The strategy document postulated three goals: climate change mitigation and adaptation, improvement of the quality of life, and creation of new growth engines. There were 10 policy action areas toward achieving those goals, and 50 policy agendas also covering those areas. The Five-Year Plan, among other things, commits 2% of the annual GDP to green growth policies and projects. The National Strategy for Green Growth is summarized in Table 1 including three objectives, three strategies, and ten policy agendas, along with paths to achieve the strategies.

Table 1. The National Strategy for Green Growth (announced in July 2009)

Three objectives:

1. Promote a synergistic relationship between economic growth and environmental protection.
2. Improve people's quality of life and promote a green revolution in their lifestyles.
3. Contribute to international efforts to fight climate change and other environmental threats.

Three strategies:

1. Mitigating climate change and promoting energy independence.
2. Creating new engines for economic growth.

3. Improving the quality of life and enhancing Korea's international standing.

Ten policy agendas to achieve the three strategies:

1. Effective mitigation of greenhouse gas emissions: the government will pursue mitigation strategies for buildings, transport and industry, require reporting on emissions and promote forestation.
2. Reduction in the use of fossil fuels and the enhancement of energy independence: Korea will reduce energy intensity to the OECD average, increase the use of renewable energy and expand nuclear power capacity.
3. Strengthening the capacity to adapt to climate change: Korea will launch the "Four Major Rivers Restoration Project" and increase the share of "environmentally friendly" agricultural products to 18% by 2020.
4. Development of green technologies: The government will pursue the development of important green technologies, boosting its world market share in the relevant sectors to 8% within five years.
5. The "greening" of existing industries and promotion of green industries: Exports of green goods in the major industries will rise from 10% in 2009 to 22% in 2020 and the government will help small and medium-sized enterprises (SMEs) green their business.
6. Advancement of the industrial structure to increase the role of services: the government will develop health care, education, finance, contents industry, software and tourism as the core of high value-added services.
7. Engineering a structural basis for the green economy: The government will gradually introduce an emissions trading system, make the tax system greener and extend public credit guarantees to green industry.
8. Greening land and water and building the green transport infrastructure: The share of passenger travel by rail will rise from 18% in 2009 to 26% in 2020, and metropolitan mass transit from 50% to 65% over the same period.
9. Bringing the green revolution into our daily lives: Carbon footprint labeling will be enacted, the government will increase mandatory procurement of green goods and education on green growth will be expanded.
10. Becoming a role-model for the international community as a green growth leader: Korea will actively engage in international climate-change negotiations and increase the share of green official development assistance (ODA) from 11% to 30% in 2020.

SWOT analysis was done in relation to green land and transportation for regulatory readiness (Figure 2). In the case of weaknesses, the uncertainties about the effectiveness of resources to be

used are pointed out. Also, inappropriate weather and natural conditions for bicycle rides cannot be ignored. Five strategies for green land and city, enlarged eco-space, green construction, green transportation and sustainable transportation are developed.

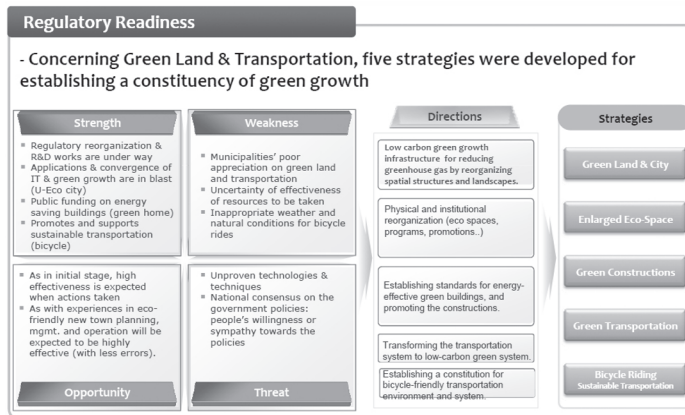


Figure 2. SWOT Analysis for Green Growth (Green Growth Committee)

The government also adopted the national metric tons green house gas (MT GHG) emission reduction target of 30% relative to the business-as-usual (BAU) baseline by 2020 and has been implementing various measures to meet this target. Korea is one of the fast growing countries in greenhouse gas emissions according to the 2011 Organisation for Economic Co-operation and Development (OECD) report.

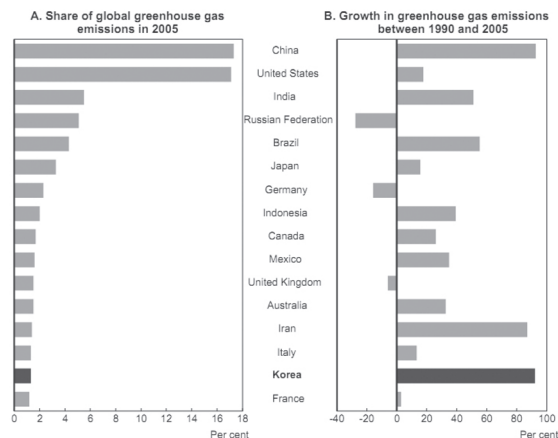


Figure 3. International comparison of greenhouse gas emissions (OECD 2011)

In December 2009, the National Assembly unanimously passed the Framework Act on Low Carbon Green Growth. The bipartisan support shown for the Act ensures the continuity of green growth policies over changes of the government. This Act authorizes the government to intervene in the market to pursue green growth in all necessary manners. The Presidential Committee on Green Growth set the reduction goals for green house gas using reduction scenarios (Figure 4). The maximum goal target is a 30% reduction by 2020.



Figure 4. Carbon Reduction Goals (Presidential Committee on Green Growth, 2009a,b)

Figure 5 illustrates the Low-Carbon Green Growth Act. To support business transformation for climate change and the energy industry, and to set up the comprehensive definition on green concepts including land, city, buildings, transformation and lifestyle, the Act took effect in 2010 after merging prior climate change and energy acts. It includes eco-friendly taxation, tax cuts on green business, and GHG reduction. Also, it introduces an emission trading scheme, establishment of a research center, a green growth fund and other measures.



Figure 5. Low-Carbon Green Growth Act

The Korean government set up a specific budget for the Five-Year Plan for green growth (2009-2013) including central and public enterprise investments. The total budget is 107.4 trillion won (see Table 2).

Table 2. Five-Year Plan for Green Growth, 2009-2013 (won in trillions)

	Total	2009	2010	2011	2012	2013
Total	107.4	17.4	24.2	25.7	20.6	19.4
Central government budget	98.9	17.4	20.5	21.9	19.6	19.4
Public enterprises' investment	8.5	-	3.7	3.8	1.0	-
<i>Memorandum item: total green technology R&D investment</i>	<i>(13.0)</i>	<i>(1.9)</i>	<i>(2.2)</i>	<i>(2.5)</i>	<i>(2.8)</i>	<i>(3.5)</i>
1. Adapting to climate change & enhancing energy independence	57.5	8.5	15.5	16.0	9.8	7.7
1. Effective mitigation of greenhouse gas emissions	5.4	1.0	0.9	1.0	1.1	1.3
2. Reduction of the use of fossil fuels and the enhancement of energy independence	15.4	2.8	3.8	2.9	3.0	2.8
3. Strengthening the capacity to adapt to climate change <i>(Four Major Rivers Restoration Project)</i>	<i>36.7</i>	<i>4.7</i>	<i>10.9</i>	<i>12.0</i>	<i>5.6</i>	<i>3.6</i>
2. Securing new growth engines	23.5	3.9	4.1	4.7	5.3	5.6
4. Development of green technologies	7.6	1.5	1.4	1.5	1.5	1.6
5. The “greening” of existing industries and promotion of green industries	4.5	0.7	0.9	0.9	1.0	1.0
6. Advancement of industrial structure to increase services	9.7	1.4	1.5	2.0	2.4	2.5
7. Engineering a structural basis for the green economy	1.8	0.3	0.2	0.3	0.4	0.5
3. Improving living standards & enhancing national status	26.4	5.0	4.6	5.1	5.6	6.1
8. Greening the land and water and building the green transport infrastructure	23.9	4.6	4.2	4.6	5.0	5.5
9. Bringing the green revolution to daily lives	1.8	0.3	0.3	0.3	0.4	0.4
10. Becoming a role-model for the international community as a green growth leader	0.7	0.1	0.1	0.1	0.1	0.1

Source: Ministry of Strategy and Finance and Presidential Committee on Green Growth

The Korean government could start an official development assistance (ODA) program because Korea was changing from a receiving country to an offering country. In ODA, the government is ready to enlarge the fields of green growth. The proportion of green ODA will be increased from 11% in 2007 to 30% in 2020. New goals of 33% in 2030 and 40% in 2050 were established. Until 2050, the Korean government will set up five-year plans to reach the green growth goals. In case of energy independency, the goals of 50% in 2020 and 100% in 2050 were established. The share of bicycles in transportation will be changed from 1.5% (2009) to 10% (2020) and 20% (2050) as shown in Table 3.

Table 3. Green Program Goals and Indicators

	2009	2013	2020	2050
Energy Independency	32%(e)	42%	50%	100%
Portion of Green Investment	16%	20%	25%	30%
Green Consumption and Purchase	2.5 trillion won	4.0 trillion won	10 trillion won	30 trillion won
Bicycle Share	1.50%	5.00%	10%	20%
Green ODA		20%	30%	40%

The Korean government also provided the standards and guidelines for establishing a metropolitan plan, an urban comprehensive plan and an urban management plan. Together the plans can deal with the possible effects from climate changes and can be compatible with the central government's Low Carbon Green Growth objectives. Also, the government forced these plans to accommodate countermeasures against green house gas emissions and possible effects from climate change. It introduced planning factors and devices to promote a low carbon and green environment in accordance with the Low Carbon Green Growth objectives.

In support of low-carbon green growth, the Ministry of Land, Transportation and Maritime Affairs announced urban planning guidelines in July 2009. They deal with standards, evaluations, predictions and countermeasures concerning the application of low-carbon green growth concepts to urban planning factors. In relation to time frames, targets, measurability and feasibility, these guidelines are clearly visible. Figuring out the current emission volumes, evaluating the energy efficiency of plans on a land use unit basis, and determining climate change influences on urban planning were implemented.

3. URBAN MANAGEMENT AND PLANNING FOR GREEN GROWTH

It is believed that as the result of rational choice processes in the struggles of man against the environment, the long term location patterns appeared. In the historical evolution of cities, large scale urbanization was an inevitable outcome of the forces of globalization and competition. The current trend towards mega-cities is inevitable; the only question is what kind of policy responses are appropriate (Kourtit and Nijkamp 2012). It is certain that international migration to large cities will continue in the coming decades, increasing the probability of social exclusion or even instability. The impact of climate change will present a challenge to the living conditions in cities. However, there is no doubt that future cities will become arenas for social action, economic vitality and ecological sustainability. The expected concentration of human capital in urban agglomerations with more skilled, creative and educated people will make them powerhouses of economic growth (Castello and Domenech 2002; Hanushek and Kimko 2000; Krueger and Lindahl 2001).

It will be the best strategy for urban management to pursue the agglomeration economies and overcome the disadvantages of climate change. In case of mega-city Seoul, financial budget allocation is very important because welfare needs have recently increased quickly. Welfare needs such as reducing education tuition, public rental housing fees and so on are very popular in various sectors within the limited budget. Therefore, a set of green management initiatives such as reducing the electricity cost in housing and buildings using green technology was designed.

- Reflecting global policy trends and reduction goals of major countries since the Kyoto Protocol of 1997, greenhouse gas reduction action plans have been prepared and implemented on a global scale to resolve climate change crises.
- The mandatory target agreed upon in Kyoto by 38 Annex I countries around the globe was an average reduction of carbon emissions by 5.2% from 1990 levels by the year 2012.

Individual countries specified their own target reductions from the Kyoto roadmap.

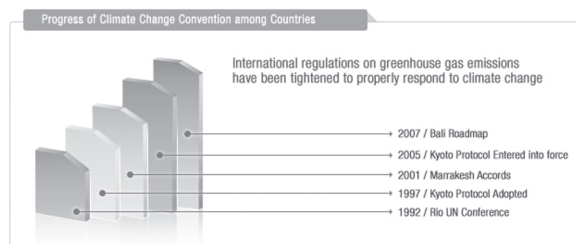


Figure 6. History of Climate Change Convention





Country	Brief Description
 EU	<ul style="list-style-type: none"> ▶ 20% reduction from 1990 levels by 2020 ▶ Effectuated EU climate-energy legislative package containing relevant directives in April 2009 ▶ Introduced and implemented European Union Emissions Trading Scheme (EU ETS) in 2005 ▶ Introduced regulation on automobile GHG emissions in 2009
 UK	<ul style="list-style-type: none"> ▶ Adopted the world's first Climate Change Act and specified reduction target in December 2008 ▶ Target reduction of 34% from 1990 levels by 2020
 US	<ul style="list-style-type: none"> ▶ January 2009 plan to invest \$150 billion in new and renewable energy industry for next 10 years ▶ Waxman-Markey Bill requiring a 17% reduction of carbon emissions from 2005 levels by 2020 passed by House of Representative in June 2009
 Japan	<ul style="list-style-type: none"> ▶ Announced a Cool Earth 50 plan in May 2007 for establishment of a low carbon society ▶ Announced J Recovery Plan in April 2009 incorporating a revolutionary low carbon strategy ▶ Announced target reduction in June 2009 of 15% from 2005 levels by 2020

Figure 7. Mid-Term Reduction Goals and Measures of Major Countries

Mandatory Reporting Rule (MRR) for Greenhouse Gases

Becoming a role model for the international community as a green growth leader is to climb the mountain step by step. The following are examples of such action steps.

- Korea will actively engage in international negotiations on climate change and make contributions by playing a constructive role in building an effective global climate regime.
- Between 2009 and 2012, the East Asia Climate Partnership was the main conduit through which the Korean government offered assistance and cooperation to neighboring developing countries in Asia to help them combat climate change. In addition, “World Friends Korea”, the overseas volunteers program, was enlarged and became more actively engaged in green growth activities in developing countries.
- Korea will also increase the amount of official development assistance, while raising the proportion of Green ODA to 20% by 2013 and 30% by 2020, compared to 11% in 2007. Also, contributions to multilateral organizations such as the UN Global Environment Facility will be expanded.
- As showcases for green growth, green growth urban models will be built and green industrial clusters that employ green technologies and green systems will be utilized. Also, the Korean government will strongly support effective multilateral organizations to spearhead green growth efforts in Asia.

Under these kinds of national level green growth strategies, each area can move towards achieving specific goals. Usually to develop and manage a city, planning and management are important. In the case of mega-city Seoul’s energy consumption level, it consumed approximately

1.6 million TOE (tons of oil equivalent) in 2007. It is approximately 9% of national consumption. In Seoul, homes, commerce and transportation accounted for 86%. This reinforces the importance of urban and transportation planning. To follow the central government acts, there will be related principles including regulations and reflections of locality in geographical and socio-economic terms incorporated into urban planning and management plans in Seoul.

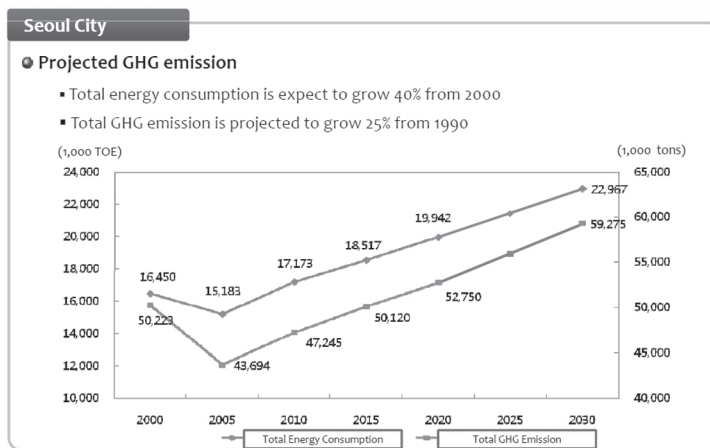


Figure 8. Projected GHG Emissions in Seoul City (Seoul Metropolitan Government)

In Seoul, total energy consumption is expected to grow 40% from 2000 to 2030. Total GHG emissions are projected to grow 25% from 1990. In the case of GHG reduction goals, Seoul city aims to reduce 40% in 2030 against 1990 emission levels.

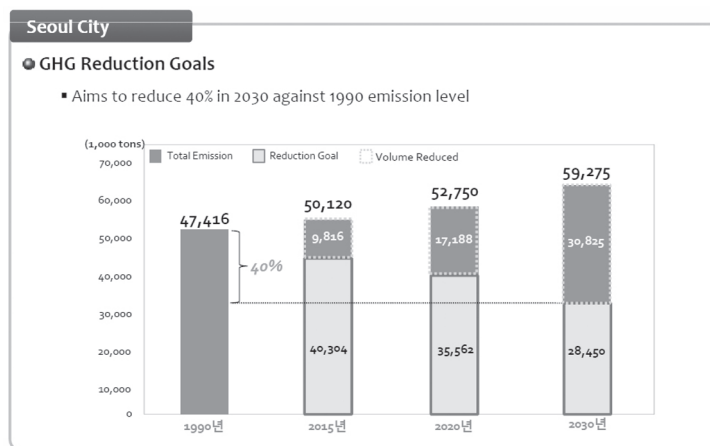


Figure 9. GHG Reduction Goals in Seoul City

The strategies for green growth in Seoul can be classified into 6 sectors: urban structure and land use, transportation, energy, industry, commerce, and households. In Seoul city, transit-oriented compact development, public transportation-oriented urban structure, green space expansion, and pleasant living spaces are being implemented in relation to the urban structure and land use.

We suggest systematic and comprehensive countermeasures against greenhouse gas emissions and climate changes in terms of spatial structures, transportation systems, natural resource conservation, environment management, energy and open spaces. We need more realistic policies that are not just words for a low carbon society and green growth. Especially, we should consider consumers in the costs, willingness to pay, and economic feasibility as well as technical feasibility.

Making a plan is important; however, feedback is just as important in the plan. In mega-city Seoul, plans reflect the capabilities of the policy department including many policy tools. Philosophy is important in the opposing party as well as the ruling party, besides the citizens themselves. Globalization is a very important direction (Sassen, 1991; UNEP, 2009a).

Reflecting smart city, ubiquitous city, and U-Eco city concepts and human behavior, we should move towards increasing efficiency and maintaining sustainable economic growth (Cairncross 1997, Cohen and Paul 2005, Forte et al., 2005). We should prepare the more detailed policies and options after reviewing and evaluating the present system of policies and instruments. Heating and cooling systems should be changed to meet the green growth criteria. The major sources of electricity are nuclear energy, and alternatives for nuclear energy should be politically decided.

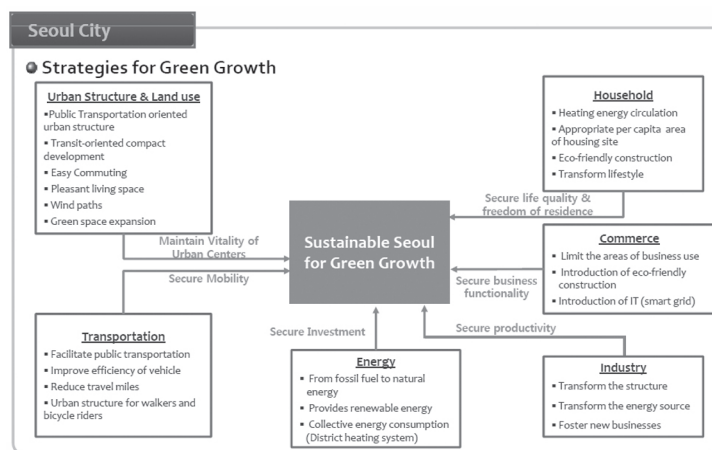


Figure 10. Strategies for Green Growth in Seoul City

4. CONCLUSIONS AND POLICY IMPLICATIONS

Briefly speaking, cities are revolutionary and complex with links to other cities. Urban dynamics for growth were emphasized in many aspects including migration, productivity and technology progress (Capello and Nijkamp 2004). To strengthen the nation's adaptation capacities to counter the adverse impacts of climate change, mitigation of climate change and energy independence for the nation are important. Also, creating new engines for economic growth is urgent including a transition to a more advanced industrial structure. Applying IT and convergence concepts to green growth and mitigation of various potential disasters, Korea can achieve improvements in the quality of life and an enhanced international standing. Especially, efforts for greening the land, water, buildings and transportation infrastructure are in the public eye.

The Presidential Committee on Green Growth established national strategies and five year plans for green growth with three strategies and ten guidelines. Concerning green land and transportation, five strategies were developed for green growth. The five strategies are the green land and city, enlarged eco-space, green construction, green transportation, and sustainable transportation.

Korea's greenhouse gas emissions almost doubled between 1990 and 2005, the highest growth rate in the OECD area. Korea recently set a target of reducing emissions by 30% by 2020 relative to a "business as usual" baseline, implying a 4% cut from the 2005 level. Achieving this objective in a cost-effective manner requires moving from a strategy based on voluntary commitments by firms to market-based instruments. The priority is to establish a comprehensive "cap-and-trade" scheme, supplemented if necessary by carbon taxes in areas not covered by trading. Achieving a significant cut in emissions requires a shift from energy-intensive industries to low-carbon ones. Korea is strongly committed to promoting green growth through its current Five-Year Plan, which envisages spending 2% of GDP per year through 2013. One challenge is to ensure that these expenditures are efficiently targeted so as to develop green technologies, while avoiding the risks inherent in industrial policy (OECD 2011). The strategies for green growth in Seoul can be classified into 6 sectors: urban structure and land use, transportation, energy, industry, commerce, and households. Making plans is important; however, feedback is just as important in the plans.

The world has now entered a new era grounded upon the revolutionary development paradigm of green growth. The successful pursuit of green growth in both national and urban levels requires innovative and pioneering technologies, novel ideas, new frameworks and mechanisms. As such, building effective global and local green governance also requires active participation and application of non-state actors who are driving the current innovation towards the sustainable future. Social inclusion is the removal of institutional constraints and enhancement of incentives

to increase the access of diverse individuals and groups to assets and development opportunities.

We should think of more incorporation of the important relations between social inclusion and environmental aspects regarding sustainable development (Cook and Swyngedouw 2012).

To build green-eco cities, rules should be changed in rational ways. Various kinds of mass transportation should be provided in some ways (Banister 2008). However, in mega-city Seoul, there are many hillsides in the road system. Hence, bicycle ride systems are not successful. In Paris, public rental cars systems are well organized. Especially, Paris is launching its first car-sharing project as it aims to clear its traffic-clogged boulevards. The backers hope the scheme will be a major boost for electric vehicles. The Autolib system is intended to build on the success of the Velib bicycle-rental service, similar to that operating in many European cities (BBC, 2011).

This is one of the examples for future revision of Korean plans. With these kinds of dimensions, policies and plans can be changed for a better mega-city. Market-based instruments are important and open to all. However, discussions on the different options, their limits and possibilities are also important (Goers, Wagner and Wegmayr 2010). We can discuss the pros and cons for nuclear energy. Its risks or acceptance by the population, which involves very controversial questions both at the scientific and political levels, are not our major topics. However, to implement the detailed policy options, we should handle these hot issues (Pidgeon, Lorenzoni and Poorting 2008, Jasanoff and Kim 2009, Venables et al 2009). Anyway, we are already living with nuclear power. Mitigating and managing the risks and uncertainty are an urgent worldwide problem. Basically, reducing nuclear energy and finding alternative options such as solar, wind, and geothermal energy are feasible. These topics should be discussed in detail for green growth perspectives.

Green growth is easier said than done. It is costly and time-consuming. It requires industry to be upgraded to an energy-efficient level and that long term investments be made in alternative energy sources, ranging from wind, solar and tidal power to nuclear fission and fusion power. Given all these difficulties, the ongoing administration will be tempted to give up on green growth and to promote economic advancement with the use of fossil fuels, all the more so if oil prices continue to go down. That is exactly what the previous administrations did when the oil crises of 1973 and 1979 were over. But the administration will have to overcome such temptations. Otherwise, the nation will have to pay an inestimably higher price for its folly when the next oil crisis comes.

The local governments as well as central government should seek to integrate resource efficiency and environmental protection with their core economic development strategies. They have to determine the ways to support the design and implementation of economic and environmental cooperation. To generate the financing necessary to attain the plausible goals and

plans, rational and feasible solutions should also be prepared. Only the specific implementations are important.

The green growth targets are number 7 in the world by 2020 and number 5 by 2050. These are meaningless targets unless green growth technology and plans for cities can work together in an integrated system. However, there is the possibility of realizing these goals. Proper responses to climate change, independency of energy, improvement in quality of life, and upgrading the nation and city are more realistic. In the case of Seoul, the more important question is how to enjoy more agglomeration effects in relation to green growth investment.

Hence, what will be the best or second best green growth policy at each city level? For that question, planning and management for future cities should be reorganized on a systematic schedule. Further detailed reactions at city levels will be helpful to achieve low-carbon green growth in Korea. Combined strategies with U-city and green growth at the mega-city level could be prepared in detail. A unified city information center (UCIC) could include urban facility, transportation, and emergency and disaster management and information functions under a wire-wireless communications system. This UCIC should be linked with administration departments, hospitals, police, and fire stations.

How to find rational solutions for the necessary global and local actions (especially in Seoul and the capital region) in a cost-effective manner? I think that this is the more realistic and urgent task. Moving from energy intensive industry to a low-carbon economy is not easy and it incurs costs. Preserving green concepts is the number one priority. Losing competitiveness in the capital region would be very dangerous for the Korean economy. Increasing the average fuel efficiency standards to reduce NOX emissions in the capital region is important but by a gradual plan. Spending less money is possible using better green belt preservation and building more green spaces in a city. Road networks are also important as well as other alternative transportation modes. Electric cars will be appearing. Allocating more to advanced and less pollution generating industries in the capital region with R&D centers linked with universities will increase efficiency and productivity. Townhouses with less than five stories and without elevators and single family housings will only be permitted for construction as policy options in considering green growth and solving over-investment in housing in the capital region. For a better future city, combined and mixed policy and urban management schemes are urgently needed.

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