

# EDITORIAL

France will be hosting the 21<sup>st</sup> Session of the Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC), from November 30<sup>th</sup> to December 11<sup>th</sup>, 2015. COP 21 will be a crucial conference, as it needs to achieve a new international agreement on the climate, applicable to all countries, with the aim of keeping global warming below 2°C. As a leading economic power officially transitioning to a low-carbon economy, and as the 12<sup>th</sup> emitter of greenhouse gases, the role played by South Korea will be critical. South Korean position regarding climate change and its national commitments are the focus of this eighth issue of Korean Analysis.

South Korea's "low carbon green growth" strategy has been a comprehensive policy framework encompassing climate change, renewable energy and sustainable development agenda since its initiation in 2008 by President Lee Myung Bak. **Lee Jae-Seung** explores the evolution of South Korea's green growth strategy since 2008 and discusses the challenges and tasks for its further

implementation based on the assessment of the first period.

**Suh Yong Chung** from Korea University argues South Korea has tried to find an adequate role in making global efforts to address climate change without disadvantaging its economic competitiveness. She presents the South Korean intended nationally determined contributions ahead of the Paris Conference, including a 38% reduction of its emissions of GHG by 2030, and two key initiatives, the Global Green Growth Institute (GGGI) and the Green Climate Fund (GCF).

**Jean-Christophe Simon**, researcher at EDDEN, believes South Korean recent announcements are modest and even "inadequate" according to some experts. Using the Poles model his research institute has developed, he compares South Korean intended contributions to more ambitious scenarios of GHG reduction.

On 1<sup>st</sup> January 2015, South Korea launched its own Emissions Trading Scheme (KETS), the

third carbon capping and trading program in Asia covering about 66% of the country's GHG emissions. **Wilfried Mourier** presents it as the result of lengthy discussions between the administration and industry representatives, and a compromise between cost concerns and efficiency.

In her thorough analysis of the Songdo eco-city, **Youngah Guahk** argues numerous levels of governance have influenced the developments in this national showcase. The Songdo case underlines that political leadership played a stronger role than existing ecological situation.

**JEAN-RAPHAEL CHAPONNIERE**

# **SOUTH KOREA AND THE CLIMATE CHANGE CHALLENGE**

## **1. South Korea's energy and climate statistics**

**JEAN-RAPHAEL CHAPONNIÈRE  
ANTOINE BONDAZ**

South Korea is the 15<sup>th</sup> largest economy and the 5<sup>th</sup> manufacturing power.

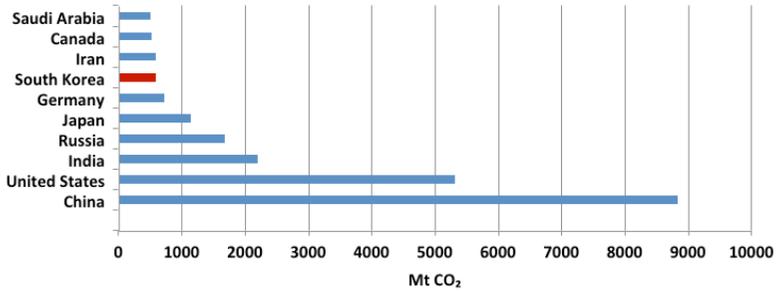
It is the 12<sup>th</sup> emitter of greenhouse gas (GHG).

With a 589 Mt of CO<sub>2</sub> emissions in 2014, the country ranks 7<sup>th</sup> in the world (4% of world total) and 4<sup>th</sup> in Asia.

South Korea ranks 25<sup>th</sup> in terms of CO<sub>2</sub> emissions per capita, 2<sup>nd</sup> in Asia behind Brunei, but ahead of China and Japan.

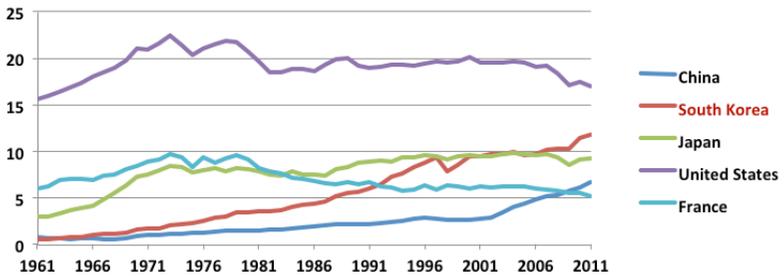
Paradoxically, the volume of emissions increased since the government adopted its green growth strategy in 2008 and is mainly due to South Korean commitments to address the 2008/2009 crisis, and to temporary stop its nuclear power plants after the Fukushima accident in 2011.

## CO<sub>2</sub> emissions from fuel combustion



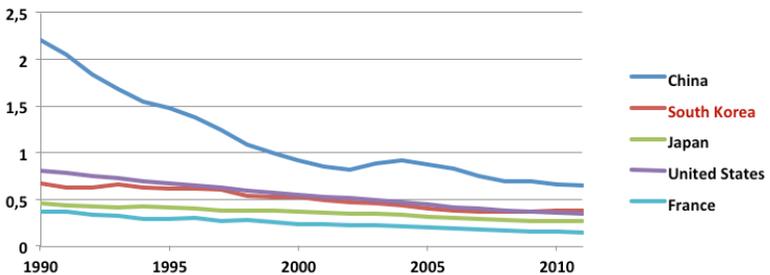
Sources: Enerdata

## CO<sub>2</sub> emissions per capita (metric tons)

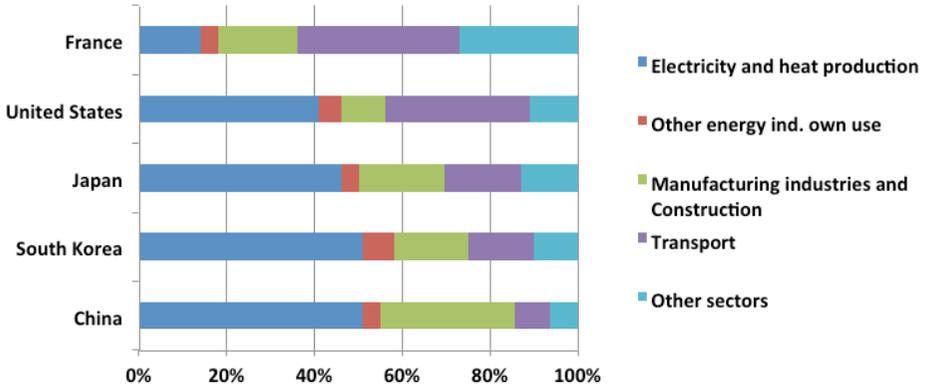


Sources: World Bank

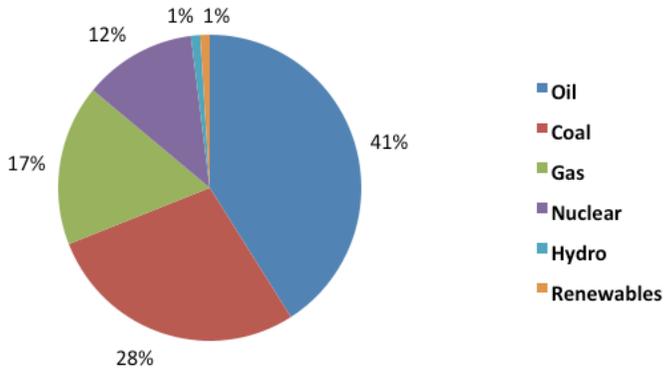
## CO<sub>2</sub> emissions (kg per PPP \$ of GDP)



## CO2 emissions by sector in 2012



## South Korean energy mix in 2012



Sources: EIA



## 2. South Korea's Green Growth at a Crossroad<sup>1</sup>

LEE JAE-SEUNG, KOREA UNIVERSITY

South Korea's "low carbon green growth" strategy has been a comprehensive policy framework encompassing climate change, renewable energy and sustainable development agenda since its initiation in 2008 by President Lee Myung Bak. A strong political momentum enabled the shift of development paradigm from fossil fuel dependent growth to a more environmentally-friendly model based on low-carbon and renewable energy resources. Green growth strategy tried to increase the supply of low-carbon energy resources, including nuclear energy, and boost the green energy industry. While emphasizing low carbon measures to deal with climate change, green growth strategies also aimed at a strong industrial boost and job creation in renewable energy sectors. The vision of new green growth paradigm was elaborated under institutional and legal frameworks. A generous budget allocation from the central government

rapidly expanded the launch of green growth projects.

However, South Korea's green growth strategy has been facing a number of challenges in recent years. A number of inquiries and concerns began to be raised on the validity of green growth. The 'top-down' strategies had to be readjusted according to changing policy priorities in the new administration. Furthermore, the actual performance of green growth measures during the first period (2009-2013) brought mixed results. The Fukushima nuclear accident and the fluctuation of oil and gas prices also affected the policy environment for green growth.

This paper examines the evolution of South Korea's green growth strategy since 2008 and discusses the challenges and tasks for its further implementation based on the assessment of the first period. The review of green growth paradigm is also meaningful in 2015 as South Korea has to set up new climate change strategies for the post-2020 period. By surveying the major progress of green growth and assessing its performance, this study tries to analyze the changing nature of South Korea's climate change and green growth paradigm.

### The Evolution of Green Growth Strategy in South Korea

The green growth strategy reflected multiple necessities to deal with the issues of climate change, energy-import dependency, fossil fuel depletion and global economic slowdown. The transition to a low-carbon economy implied a transformation of key economic sectors, the deployment of new technologies, as well as many lifestyle changes throughout society. The green growth strategy identified measures to reduce both greenhouse gas (GHG) emissions and dependence on fossil

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<sup>1</sup> This article was revised from the author's earlier version, "Corée du Sud: la croissance verte comme stratégie" published in *Regards sur la Terre 2015: Construire un monde durable* (Armand Colin).

fuels while connecting these goals with an imperative to create jobs.

Since its presentation in August 2008, the South Korean government introduced a series of follow-up measures. In 2009, the 'Green New Deal' was announced as an economic stimulus package to cope with the global financial crisis by developing green technology and investing in environmental industries. Green growth strategy also made a fast progress in building up its legal base and institutional structure. The Framework Act on Low Carbon Green Growth (hereafter Framework Act) provided a solid overarching legal base. The Presidential Committee on Green Growth (PCGG), which was created by combining existing committees of sustainable development, climate change and energy, enabled a more systematic policy-making in green growth agenda. The first National Basic Energy Plan (NBEP), published in 2008, projected the energy demand and fuel mix by 2030 and set a renewable energy target of 11% of the primary energy consumption in 2030, which was a huge increase from the previous ratio of 2.14% in 2006.

As a key instrument for renewable energy development, the government introduced the Renewable Portfolio Standard (RPS) in 2012, replacing the existing feed-in-tariff system. The RPS target would be increased from 2% in 2012 up to 10% by 2020. It was expected to provide a stable framework for domestic market expansion together with a number of green growth policies such as the Emissions Trading System (ETS), Green Home, Green City projects, etc.

South Korea's strong industrial infrastructure was expected to nurture green energy sectors. South Korea's leading heavy industry companies entered the wind power business, while major electronic companies announced their participation in the photovoltaic cell

industry. South Korea's advanced IT and electronic technology capabilities were expected to galvanize the projects in the smart-grid field. In addition, the government implemented rigorous R&D investment plan to fill a technological gap between South Korea and the world's leading green energy countries<sup>2</sup>. A generous budget allocation on green growth has broadened the policy platforms and galvanized academic discussions.

As part of its actions to combat climate change ahead of the Copenhagen Conference, the South Korean government confirmed in November 2009 a commitment to low-carbon green growth by announcing a midterm target of a 30% GHG reduction by 2020 (according to the business as usual (BAU) scenario). In addition, national GHG reduction targets were established for specific sectors, including transportation (26.7%), buildings (26.9%) and the power generation sectors (34.3%) – again compared to 2020 BAU levels – while the industry sector as a whole was given an 18.2% reduction obligation.

At the global level, the green growth strategy made a few major institutional achievements. The Global Green Growth Institute (GGGI) and the Green Technology Center (GTC) were established as global hubs of green growth, while South Korea has also hosted the Green Climate Fund (GCF). The green growth strategy has rapidly evolved as a representative policy paradigm of the Lee Myung Bak administration.

In spite of the alleged rhetorical reluctance, the subsequent Park Geun Hye administration has

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2 Key energy technologies include new and renewable energy (photovoltaic, wind, fuel cell, IGCC, biofuel); energy efficiency/carbon reducing technologies (clean fuels, energy storage, efficient lighting, green cars, energy efficient buildings, heat pumps); and electricity/nuclear energy (nuclear, smart grid, clean thermal power).

reaffirmed its continued support for the green growth paradigm. President Park pledged South Korea's contribution of \$100 million to the GCF and underlined the country's active role in global cooperation to tackle climate change. The second NBEP for 2035 was enacted in 2013, adding renewed emphases onto demand management, distributed generation and a reduction in the proportion of nuclear power generation. The 40% self-development in energy supply and the 11% target for renewable energy in the primary energy supply remained unchanged from the first NBEP. The Second Five Year Plan for Green Growth (2014-18) adopted in July 2014 reaffirmed three policy objectives: 1) establishing a low-carbon economy and social structure; 2) realizing a creative economy through the convergence of green technology and ICT; and 3) constructing living conditions that are clean and resilient to climate change. A long-discussed emission trading scheme (ETS) was finally introduced in 2015.

## The Challenges on Green Growth

In spite of rapid expansion of policy and legal frameworks, South Korea's green growth strategy has also faced growing challenges in the aftermath of the Lee Myung Bak administration. These challenges can be found in following categories:

## Performance of green growth

The primary goal of green growth strategy was a transition from a fossil fuel-based energy structure to a low-carbon energy system based more on renewable energies. The renewable energy target set by the government was, in fact, an ambitious one. Since the introduction of green growth, there has been a noticeable development in solar PV and wind energy in South Korea. However, the contribution of wind and solar energy was not significant, accounting for 2.2% (wind), 2.7% (solar) and 0.3% (thermal) of the total new and renewable energy supply. Waste energy took the biggest portion of total renewable energy supplies. As shown in <Table 1>, the portion of renewable energy in total primary energy supply has been quite limited in spite of its increase during the first five years of green growth. The increased use of fossil fuels, especially coal and natural gas, was more visible. Much of the criticism, therefore, has centred on overblown expectations and slow achievement of the renewable energy target.

A series of external variables, such as the global economic downturn and an overall recession in global renewable energy industries, has also affected the progress of green growth in South Korea. The shale gas boom in North America has forced renewable energy sectors to compete with the cheaper fossil fuels,

Table 1: Primary Energy Supply in South Korea

Year	Primary Energy Supply (1,000 toe)												
	Total	Coal		Petroleum		LNG		Hydro		Nuclear		Renewables	
2006	233,372	56,687	24.3%	101,831	43.6%	32,004	13.7%	1,305	0.6%	37,187	15.9%	<b>4,358</b>	<b>1.9%</b>
2007	236,454	59,654	25.2%	105,494	44.6%	34,663	14.7%	1,084	0.5%	30,731	13.0%	<b>4,828</b>	<b>2.0%</b>
2008	240,752	66,060	27.4%	100,170	41.6%	35,671	14.8%	1,196	0.5%	32,456	13.5%	<b>5,198</b>	<b>2.2%</b>
2009	243,311	68,604	28.2%	102,336	42.1%	33,908	13.9%	1,213	0.5%	31,771	13.1%	<b>5,480</b>	<b>2.3%</b>
2010	263,805	77,092	29.2%	104,301	39.5%	43,008	16.3%	1,391	0.5%	31,948	12.1%	<b>6,064</b>	<b>2.3%</b>
2011	276,636	83,640	30.2%	105,146	38.0%	46,284	16.7%	1,684	0.6%	33,265	12.0%	<b>6,618</b>	<b>2.4%</b>
2012	278,698	80,978	29.1%	106,165	38.1%	50,185	18.0%	1,615	0.6%	31,719	11.4%	<b>8,036</b>	<b>2.9%</b>
2013	280,290	81,915	29.2%	105,811	37.8%	52,523	18.7%	1,771	0.6%	29,283	10.4%	<b>8,987</b>	<b>3.2%</b>

especially natural gas. In fact, a number of renewable energy companies withdrew from the market or reduced the business size.

Greenhouse gases (GHGs) emission has also shown an increasing trend as shown in <Table 2>. From an industrial viewpoint, the structure of South Korea's economy remains unfavorable to low-carbon emission given that the country's main industrial sectors are energy intensive and export-oriented, such as steel and petro-chemical. In spite of the emphasis on GHG reduction, climate change measures were not fully implemented during the green growth period. A number of GHGs mitigation measures were either under planning or implemented slowly. A rapid increase of electricity consumption became a major concern in this period and power generation, especially coal-based electricity, had to be kept at the maximum level. Electricity consumption in industrial sectors, especially steel industry, has increased significantly together with the expansion of their production capacity. Overall, industrial sectors had a huge concern on the consequences of GHG mitigation target on their competitiveness.

#### *Environmental consequences & nuclear agenda*

Even though green growth strategy highlighted environment-friendly development, a number of projects also brought adverse environmental consequences. The Four River Restoration Project, to which the largest budget share of the green growth Strategy were allocated, has often been criticized for its adverse effects on the environment. A number of water boom cases in the major rivers have been attributed to the Four River Restoration project even though their scientific evidence was not fully confirmed. The projects to increase green homes and green jobs did not meet the intended environmental goal, either.

The validity of nuclear energy is another challenge to the green growth paradigm. Nuclear energy was included in the green growth strategy as one of the most important low-carbon measures and promising profit-makers. However, the government's commitment to nuclear expansion has faced increasing challenges on safety grounds in the wake of the Fukushima nuclear accident. Even though the incumbent government still admits the inevitable necessity of nuclear energy as an important low-carbon and strategic energy source, the compatibility between nuclear energy and green growth is debatable.

#### *Waning political support*

The strategy of green growth was perceived as a flagship policy agenda during the Lee Myung Bak administration. However, the perceived priority of green growth policies seems to have decreased under the Park Geun Hye administration and the new government appears to have cooled down on the ambitions of the previous administration. The government agency in charge of green growth was transferred from the Presidential Committee on Green Growth (PEGG) to the Prime Minister's Office. The nuance of green growth has shifted implicitly from a 'sacrosanct doctrine' to a 'political taboo' among the policy-makers. In fact, the politically overstated nature of the green growth has often led to negative repercussions.

The green growth strategy was devised and implemented by the conservative government and reflected a substantial degree of industrial policy in addition to its highlights on environment. The cohabitation between "green" and "growth" inevitably brought a series of debates once the political fever got waned. In fact, the idea of green growth was suggested by the conservative government, which had a strong orientation of economic

growth and industrial competitiveness. Under a new political circumstances, the interim assessment of green growth brought a series of criticisms from diverse political opponents ranging from environmental NGOs and progressive parties to business sectors and anti-Lee Myung Bak factions in the conservative party. Even though those critiques did not deny the paradigm of low-carbon development itself, the rhetoric of green growth is facing a critical challenge to redefine its scope and characteristics. Many of previous stakeholders wanted to distance themselves from the rhetoric of green growth as the previous administration became a usual target of political blaming. A strong political initiative of green growth became ironically a political liability under the new administration.

### **Toward the Next Stage of South Korea's Green Growth**

South Korea's Green growth strategy is still undergoing a process of consolidation and, at this stage, it is too premature to make judgments on whether it has been an overall success or failure. Instead of adding another political judgment, this study proposes a few tasks to reshape the green growth paradigm as a more durable long-term national agenda.

First, the successful implementation of the green growth strategy should be based on the realistic scoping of its action plans to mobilize continued political support. The idea of green growth has certainly built a solid platform as a new growth model in South Korean society. The institutional and legal framework of green growth still remain and function as a basis for a number of low-carbon policy measures. The implementation of the green growth measures should also take advantage of these existing frameworks.

Second, the discourse of green growth should include more environmental and ecological

aspects. While pursuing dual objectives of environment and growth, the assessment of green growth during the first period has shown its strong orientation toward industrial and developmental elements. The balancing toward the "greener" side such as more proactive GHGs mitigation and decentralized energy supply system would strengthen the validity of green growth paradigm.

Finally, South Korea's green growth should be based more on "bottom-up" approaches. The introduction and implementation of green growth strategy were driven mostly by "top-down" initiatives from the central government and bureaucracy. Even though a strong political initiative was effective in the fast launch of green growth strategy, it still needs to be supplemented by a more active citizen participation and voluntary local-level projects. A waning political nature of green growth might be an opportunity to redesign the second version of low-carbon green growth based on the momentum from civil society.



### **3. What Contributions Can South Korea Make at the 2015 Paris Climate Change Conference?**

**CHUNG SUH-YONG, KOREA UNIVERSITY**

As the 12<sup>th</sup> largest greenhouse gas emitter, South Korea has tried to find an adequate role in making global efforts to address climate change without disadvantaging its economic competitiveness. Instead of regarding climate change as an issue of cost, Korea has continuously developed its climate strategies by considering the issue as an opportunity. By placing the importance on promoting low carbon development as a strategy for South Korea's economic growth, Korea has strived to lead the discussions in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations by emphasizing GGI and GCF, and its implications for climate strategy and finance.

#### **Korea's Intended Nationally Determined Contributions (INDC): Continuous but Insufficient Efforts**

As a country in the category of Non Annex I or developing countries, South Korea has identified itself to play a bridging role between developed and developing countries in the UNFCCC negotiations. Since members of the

UNFCCC agreed to individually submit each country's Intended Nationally Determined Contributions (INDC), Korea struggled to prepare its own INDC which would meet the expectations of the international community. After substantial deliberation, Korea finally submitted its INDC on June 30<sup>th</sup>, which includes greenhouse gas (GHG) emissions reduction by 37 percent from the business-as-usual (BAU) by 2030. This proposed target is more ambitious than the previous voluntary GHG emissions reductions target that was announced by the former Lee Myong-bak government. At that time the Korean government made the decision to reduce GHG emissions by 30 percent from the BAU level by 2020, after a highly heated domestic debate.

Initially, the Korean government came up with four options in the preparation process of INDC, all of which contained lower GHGs emissions reductions target than the proposed reductions target by Lee government. The four options were as follows:

- Option 1. 14.7 percent reduction from the BAU level of 2030 (or 5.5 percent increase compared to the target prepared by previous government)
- Option 2. 19.2 percent reduction from the BAU level of 2030 (or 0 percent increase compared to the target prepared by previous government)
- Option 3. 25.7 percent reduction from the BAU level of 2030 (or 8.1 percent decrease compared to the target prepared by previous government)
- Option 4. 31.3 percent reduction from the BAU level of 2030 (or 15 percent decrease compared to the target prepared by previous government)

Although Option 4 seemed to be setting the most ambitious target to reduce GHG emissions, it contained several controversial means of reducing GHG such as increasing

the use of nuclear power. Many international opinion leaders also criticized Korea's plan to reduce GHGs emissions, before Korea finalized its INDC to submit to the UNFCCC secretariat. Similarly, some of the Annex I countries raised concerns over South Korean government's weak ambition in tackling climate change and strongly requested South Korea to submit a stronger INDC. Other various options were put forward in the public hearings, but they were again criticized for not being ambitious enough. As a result, the government of Korea went through another round of preparation for its INDC in order to meet the expectations of international community. Despite the contestations among the relevant ministries and stakeholders, South was able to finalize and submit its INDC to the UNFCCC Secretariat on June 30.

Compared to the original 4 options, the submitted INDC of South Korea contains a more aggressive goal and measures to reduce its GHG emissions. As a way of promoting new opportunities for the energy industry and continuing its leadership role in the international society, Korean government decided to adopt a more ambitious target than any one of the original four options. In addition to the plans of Option 3 of reducing GHGs emissions by 25.7 percent from the BAU level by 2030, additional 11.3% reduction was added. In implementing the INDC, South Korea will fully utilize the International Market Mechanism (IMM), which will allow the country to buy emissions credits from other countries. In particular, it may be possible for South Korea to develop a unique strategy to bring in North Korea participation by developing carbon credit mechanisms through various low carbon climate resilient activities in North Korea. South Korea also plans to implement various measures to maintain the competitiveness of industries. For this purpose, the country is considering the revision of acts and legislations regarding the

Emissions Trading Scheme, increase in use of nuclear power, and promotion of low carbon technologies for transportation and buildings.

Despite the ambitious targets proposed by South Korea's INDC, it could benefit from a more detailed plan outlining the specific steps to be taken to reduce GHG emissions. It is highly likely that a low-carbon economy-based, bottom-up approach will be introduced and emphasized at the upcoming COP 21. In addition to the top-down, regulation-based efforts to reduce GHG emissions, the promotion of low carbon technologies and business will become a primary strategy to realize a low emission society. Therefore, Korea's INDC could have been improved by including a detailed plan for promoting low carbon economy (currently part of Korea's Creative Economy policy) as a way to achieve the GHG emissions target outlined in the INDC.

### **Can South Korea Lead Discussions on Strategy and Finance?**

In order to achieve a low carbon economy, a well-crafted low carbon growth strategy will be critical. In particular, securing sufficient financial resources is pivotal to carrying out low-carbon growth plans. Therefore, it is important for Korea to develop an adequate approach to promote low-carbon growth strategy and financing at the UNFCCC negotiations on the topic of designing a Post-2020 Climate Change Regime. In particular, two intergovernmental organizations – the Global Green Growth Institute (GGGI) and the Green Climate Fund (GCF) should be key to Korea's approach for the upcoming negotiations.

#### *Global Green Growth Institute*

The Global Green Growth Institute (GGGI) was established in 2012 under the leadership of South Korea to assist developing countries in

creating and establishing their own new low-carbon growth paths. Considering the fact that a greater portion of GHG will be emitted by developing countries in the near future, it will be critical for developing countries to prepare their economic growth plans based on low carbon growth pathways. Therefore, there will be a growing need for organizations that can work closely with the governments of developing countries to promote low carbon development and identify appropriate sectors to realize low-carbon growth.

In fact, there are only a few international organizations that can help developing countries in devising their own low-carbon growth plans based on each country's unique economic, political and social conditions. More importantly, as can be found in many of the INDCs submitted by developing countries, those low carbon growth plans can be fully integrated into the integral part of INDCs. In this sense, the GGGI has a huge potential to become a leading INDC organization that can support countries to better plan and design their INDCs based on low carbon developing pathways.

However, GGGI's recent developments seem to be a little disappointing. Initially, GGGI's activities seemed to be more appropriate for upper and middle-income developing countries (such as China, India, Korea, Mexico, Indonesia, Brazil and South Africa) which together represent a large portion of the global GHG emissions. Considering their reluctance to take on legally binding obligations to reduce GHG emission, it was regarded that encouraging these upper and middle-income countries develop their growth plans according to low carbon pathways was seen as a better solution to tackle climate change.

However, according to the recently adopted Strategic Plan of the GGGI, GGGI will focus its

efforts more on Less Developing Countries and allocate more resources to these countries. While promoting low carbon growth in less developing countries to alleviate poverty may be important, equal emphasis should be also given to promoting low carbon growth as a way of reducing GHG emissions of advanced developing countries, which represent most of GHG emissions of developing countries.

It is also true that GGGI has placed less emphasis on planning aspect of green growth and low-carbon development. The primary department in GGGI that is responsible for this role is the Green Growth Planning and Implementation (GGP&I) which was supposed to help developing countries in planning and implementing their low carbon green growth plans. As the implementation aspect of the green growth plans would need to be carried out by each government, the initial focus of GGP&I's activities were given to planning. However, GGGI's recent Strategic Plan as well as recruitment of staff for GGP&I department together demonstrate that the GGGI now places greater importance on implementation aspect of low carbon development plans.

In this situation, Korea, not only as a host country but also as the biggest financial contributor to the GGGI, must devise its approach to guide the GGGI to develop adequate planning and implementation strategies to realize low carbon development in developing countries. In the context of UNFCCC, Korea also needs to further its efforts to mainstream GGGI's low carbon development planning and implementation so that it can be used to design INDCs.

#### *Green Climate Fund*

In order to secure long-term financing to promote the paradigm shift toward low-emission and climate resilient development pathways, a Green Climate Fund (GCF) was

established. The GCF is supposed to function under the guidance of the Conference of the Parties of the UNFCCC.

During the Lee Myung-bak administration, the South Korean government was keen on hosting the GCF in order to make greater contributions to developing global rules and institutions on climate financing. At the international level, while the GGGI was regarded as an organization which may provide low carbon growth planning services, the GCF was important to channel financial resources to actually implement the prepared low carbon development economic plans of the developing countries. Thanks to its active role in promoting low carbon green growth policy both at domestic and international levels, including its efforts to establish the GGGI, South Korea was able to successfully hosted this important climate change organization.

Since the establishment of the GCF, Korea has tried to make further contributions to the issues related to the GCF. During the UN Climate Summit in New York in 2014, South Korea announced its plans to make financial contributions up to 100 million USD to the GCF. In a situation where most financial contributions came from Annex I countries, South Korea's financial commitment was seen as an exceptional effort in playing a bridging role between developed and developing countries. As a result, other developing countries such as Mexico and Peru followed South Korea's precedent of making financial contributions to the GCF as a non-Annex I country.

Based on its active role in climate financing, South Korea needs to more actively contribute to developing arrangements for the Post 2020 climate change regime, which will ensure the effective outcome of addressing climate change by promoting low carbon development planning and implementation.



#### **4. South Korea and the climate challenge**

**JEAN-CHRISTOPHE SIMON, EDDEN**

**TRANSLATION : ANTOINE BONDAZ**

South Korea has strived to become an advocate and a world leader on climate change in presenting, as early as 2008, a national plan for a green and low-emission oriented economy. Compared to that plan, recent announcements on national targets to reduce greenhouse gas emissions appear modest and, according to some experts, even "inadequate". Indeed, the South Korean Intended Declared National Contributions (INDC) ahead of the Paris Conference (COP 21) does not meet international expectations on the possible efforts South Korea seemed to be inclined to make. Is it a political U-turn or just a tactical approach?

This article aims at examining the discrepancy between the South Korean grand design of green growth presented in 2008, and its intended contribution in 2015. We will briefly review the South Korean macroeconomic framework of energy - climate related-issues; discuss the South Korean intended contribution; and present possible national trajectories towards a low-carbon future that

result from the Poles models developed by EDDEN.

South Korea, a leader in the green economy? Since the Conservatives came to power in early 2008, South Korea has taken a very ambitious international stand on green growth issues. In his speech before the UN General Assembly in 2009, former President Lee Myung Bak repeated the enthusiastic national objectives presented at the 60<sup>th</sup> anniversary of the Republic of Korea, a year earlier, and offered his new vision for a green growth and low carbon economy.

Under the framework of the UNFCCC, the third South Korean National Communication of 2011 highlighted a new low-carbon growth paradigm and Yoo Young Sook, Minister of Environment, presented a series of climate policies that illustrated its government's commitment. South Korea became a world leader via several initiatives such as the East Asian Climate Partnership (a framework for technical and financial cooperation), the establishment of the Global Green Growth Institute in Seoul (a global think-tank) and the hosting of the Green Climate Fund Secretariat in Incheon, close to the eco-city of Songdo. Three motives could explain these South Korean political initiatives: trigger a "green recovery" after the global financial crisis, occupy a leading position in energy-climate related technologies, and strengthen its "soft power" in the region.

Nevertheless, South Korean quest for exemplarity may appear as a paradox. A developed economy member of the OECD since 1996, with an economic structure that is an example of "carbon industrial capitalism" facing a sharp increase in energy consumption and GHG emissions because of its rapid urbanization, South Korea faces major challenges to become a fully-fledged green economy. Moreover, South Korean

challenge is even more daunting that its energy consumption relies heavily on oil, gas, coal and uranium. Indeed, fossil fuels top its electricity mix<sup>3</sup>. Nonetheless, increasing the share of nuclear electricity could contribute to enhance South Korean mastery of these technologies while maximizing its export potential and reducing its GHG emissions.

### **South Korea's commitments to the global climate regime**

South Korean difficulties to balance energy demand and CO<sub>2</sub> emissions may explain its cautious stance ahead of the Paris Conference. At the COP 15 at Copenhagen, South Korea had announced a 30% reduction of GHG emissions by 2020 compared to Business As Usual (BAU) scenario. However, its various domestic green growth projects and its pledge to transition to a low-carbon and green economy could have led the South Korean government to offer a more ambitious scenario.

In the UNFCCC, South Korea is not part of the Annex 1 countries of the Kyoto Protocol, i.e. a member of the industrialized countries. Therefore, South Korea is not subject to constrained reductions. South Korea remains a modest GHG emitter (1.5% of global emissions) compared to Japan (2.6%), India (6.3%) and China (23.2%). However, South Korean GHG emissions have doubled between 1990 and 2010, and have kept rising since 2000, in both absolute and per capita terms.

Ahead of the Paris conference, the South Korean government has announced a 37% reduction of its emission by 2030. This

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3 EISEN Steven, BONDAZ Antoine, « L'avenir du nucléaire civil sud-coréen : entre indépendance énergétique et crainte d'un incident », *Korea Analysis*, No.5, février 2015

downward trend represents a 300 million tons reduction. It would originate for two thirds from domestic efforts and one-third from interventions on the international CO<sub>2</sub> market. The first part relies on mitigation policies in key areas such as energy, industry, housing and urban infrastructure. The second part consists of acquiring more carbon credits on international markets. South Korea has actively participated in the implementation of clean development mechanisms, has received more certified *emission reduction* than all ASEAN countries combined in 2012 and launched in 2015 its own Korea Emissions Trading Scheme (KETS). Eventually, South Korea is trying to adapt to climate change. To do so, various ministries have prepared plans to deploy monitoring and climate information systems in order to improve management of ecosystems and water resources, etc.

### Is a radical transition possible?

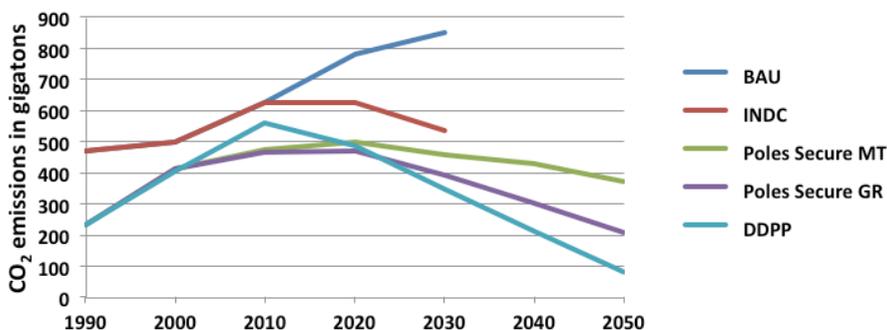
Given the structure of the South Korean economy and its ambitions, the energy transition issue is acute. However, the debate is still embryonic among academic circles, officials and companies. The imperative of

economic progress remains dominant, as evidenced by the debate surrounding the establishment of KETS. Yet, stakes are high. According to the BAU scenario, South Korea could become one of the top OECD CO<sub>2</sub> emitting countries. The coming decade is crucial to alter trends and adopt measures that will transition South Korean economy to a low-carbon economy. The next graph aims at comparing various scenarios of GHG reductions in order for South Korea to better position itself and take appropriate mitigation policies.

The Poles model developed by EDDEN simulates the energy demand and supply for 32 countries and 18 world regions. It is used in many forecasting studies and is made of 15 energy demand sectors and 40 technologies of power production. For the demand, behavioral equations take into account the combination of price and revenue effects, technico-economic constraints, and technological trends. The changes in international prices of oil, gas and coal are endogenous.

Both GR and MT scenarios are derived from Poles models that are considering a

**Evolution of South Korean CO<sub>2</sub> emissions depending on different scenarios**



shift in trends based on global climate goals growth plans that are weakly binding in the case of Muddling Through (MT) scenario, and more restrictive in the case of Global Regime (GR) scenario. These scenarios are shaped by assumptions of changing South Korean economy and demographics, and several paths of de-carbonization. The Deep De-carbonization Pathway Project (DDPP) reflects a voluntary path of sharp reduction and means significant mitigation policies.

In all three scenarios, the most important parameters for de-carbonization, as well as their hierarchy, are similar to those adopted by most of energy-climate models. They mobilize advanced technologies, renewable energy and carbon sequestration to varying degrees. De-carbonization of the domestic power mix appears to be the most crucial development. Reliance on fossil fuels would be drastically reduced by 2050. However, these de-carbonization scenarios remain conditional since major strategic tradeoffs can be made in connection to international constraints (world energy prices, evolution of the carbon market, new climate commitments, etc.) and domestic priorities.

As the graph shows, the peak of CO<sub>2</sub> emissions would be reached between 2015 and 2025. If the South Korean proposal shows a significant decrease from the BAU scenario<sup>4</sup>, both MT and GR scenarios show an even sharper one. Moreover, going from a 1% annual growth of GHG emissions, to a 2% annual reduction between 2020 and 2030, and a 3% annual reduction between 2030 and 2050, require considerable efforts.

## Conclusion

South Korea will address the COP 21 as an OECD economy. On one hand, it will seek to take an honorable diplomatic position; on the other hand, it will have to take a tough stance on its long-term prospects of transition towards a low carbon economy. South Korean is likely to adopt a cautious approach, and is not likely to try to become a leader as several countries already intend to do so. To meet its commitments, South Korea will have to redouble its efforts and position itself in the third industrial revolution to consolidate its leading position in green growth technologies. The search of new competitive advantages could be based on digital technologies, energy mastery and infrastructure engineering of eco cities.

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4 SUH Yong-chung, « What Contributions Can Korea Make at the 2015 Paris Climate Change Conference? », *Korea Analysis*, No.8, septembre 2015



## 5. South Korea, a new actor in the carbon market

**WILFRIED MOURIER**

**TRANSLATION : JI-SOOK LEE-KAUTZ**

The most recent Emission Trading System (ETS) was created in the Republic of Korea in 2015. Much like its European or U.S. equivalents, this system has progressively established itself as the instrument of a climate policy aimed at reducing emissions of greenhouse gas (GHG). The Republic of Korea, the world's fifth largest oil importer, is keen to promote a greener growth. But the country is faced with the demands of the private sector to limit the economic cost of "de-carbonization".

Economic development based on the increased consumption of natural resources has led our societies to have a major impact on the global level of resources and the environment. Climate change linked to human activity is creating changes of such magnitude that Crutzen stated we were entering a new geological age: the Anthropocene. However, in most regions of the world, the atmosphere is a res nullius, a thing which has no owner, with free access for anyone wishing to produce CO<sub>2</sub> or any other GHG. This issue can be solved by establishing a price per ton of CO<sub>2</sub> emissions.

This pricing system can be implemented either through a tax or the creation of a system of tradable permits that can be negotiated, a quota trading system. The regulatory body determines the sectors and companies subject to the regulations as well as the authorized GHG emission quantities. Each company may arbitrate between the purchase of quotas on the market and the implementation of measures to reduce its emissions. The system is efficient because the least costly measures are decided first. Ultimately, on the basis of corporate demand for quotas, a market price will be determined through the confrontation between the supply and demand for quotas.

There is a growing interest in negotiable permit systems worldwide. After the first two operational phases of the European Union Emissions Trading System (EU ETS), the idea of resorting to the market to respond to the increase in GHG emissions has spread among OECD countries and developing nations. To date, there are 15 operational programs and there appears to be important prospects for even more. In order to understand the extent to which the ETS has made it possible to meet the political commitments of President Lee Myung-bak and to appreciate its degree of acceptance by the private sector, we will return to the climate policy implemented by South Korea and the adoption of this ETS. We will then take a more in-depth look at the technical characteristics of this market mechanism in order to understand the compromises that have made its implementation possible.

### **The context of the Korean Emission Trading System (KETS): Stimulus, environment and the creative economy**

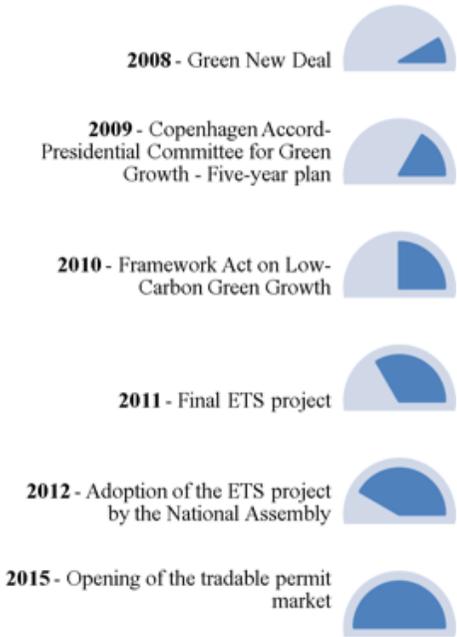
President from 2008 to 2013, Lee Myung-bak campaigned among others on the economic advantages and benefits of a low-carbon way of development in a country where the energy consumed is provided predominantly by coal and oil – and to a lesser extent by uranium

for the production of electricity. It is in this context that his administration implemented a “Green New Deal.” This program aimed to revive the domestic economy as it was facing the consequences of the global crisis of 2008 by initiating “green” investments. Established in 2009, the Presidential Committee for Green Growth was entrusted with the mission to promote the national objective of low-carbon growth and to draft the five-year plan (2009–2013).

Succeeding to Lee Myung-bak in February 2013, Park Geun-hye first showed reluctance to continue the green policy engaged by her predecessor. However, even though the slogan of creative economy is now preferred to that of green economy, the political orientation of the new administration is not at odds with the programs launched by Lee Myung-bak. The new president has stated that the fight against climate change featured among the priorities of her administration, a declaration that is testament to the continuation of the South Korean commitment. Indeed, the concept of “creative economy” includes green growth and appears first and foremost to be a political strategy to distinguish herself from her predecessor.

On 6 April 2010, the Korean administration adopted the Enforcement Decree of the Framework Act on Low Carbon Green Growth. It outlined the medium and long term objectives for the reduction of carbon emissions but also the needs for information, carbon labelling, carbon taxation, and the use of renewable energies. Most importantly, this law provided the guidelines for the creation of an ETS. One year later, the South Korean administration published its final ETS project. Based on the model of the EU ETS, the KETS is a three-phase program. The capping and trading system was adopted by the National Assembly in May 2012 and, following the initial project timetable, the first

phase of the program was scheduled to start on 1<sup>st</sup> January 2013. However, a group of over 500 manufacturers opposed it by underscoring the risks for Korean exports due to a decrease in competitiveness. It was only after negotiations on the functioning of the KETS between the administration, the private sector, non-governmental organizations, experts and other stakeholders that a legal basis was found in December 2013. So, it was in a political environment where development and economic stimulus were built on innovation and large scale public works that the idea of a carbon market was born. The objective of successive administrations is the promotion of environment-related new technologies. The R&D in the field of renewable energies and energy efficiency appears as a prospect for economic growth because of the global dynamics regarding the reduction of GHG emissions.



## **A compromise between cost and economic efficiency**

The foundations of the ETS are on the one hand the definition of perimeters and on the other hand the determination of objectives. The first criteria concerns as much the types of GHG, the geographic definition of the regulations as well as the sectors and entities that will have to report on their efforts to reduce their emissions. It will provide the answers to the questions “what”, “where” and “who.” The second criteria delivers information on the level of commitment by sector and by entity. Each system must determine the reduction level that must be met over a period of compliance: “how much” and “when.” The advantage of such a mechanism lies in the freedom it allows the regulated entities to choose the means to achieve their goal (i.e. “how”).

On 1<sup>st</sup> January 2015, the Republic of Korea launched the KETS, the third capping and trading program operating nationally in Asia. It is applicable to individual installations emitting over 25,000 teqCO<sub>2</sub> per year or to entities which combined installations emit over 125,000 teqCO<sub>2</sub>. As such, the South Korean ETS will cover about 500 companies, in addition to the five national airlines and over 1,600 installations, that is about 66% of the country's GHG emissions. It includes the six GHGs in the Kyoto Protocol: CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, PFCs, HFC and SF<sub>6</sub>.

In an ETS, the GHG quantity that companies are allowed to emit is distributed in the form of quotas. But the method for allocating these quotas creates frictions between the recommendations of the scientific community and political decision-makers. While economists argue for the auctioning of permits, government authorities favor their allocation free of charge based mainly on historical data. Korea is no exception to this rule, with

100% of the quotas allocated free of charge in phase I, 97% of them in phase II, and 90% in phase III. The choice of this allocation method ensures its acceptance by the private sector and allows participants to adjust progressively. Consequently, while theory argues in favour of a quota auctioning system for better economic efficiency, their distribution free of charge makes it possible to avoid a deadlock of the negotiations and decreases the adjustment cost for the private sector.

After lengthy discussions between the administration and industry representatives, other corrective steps have been taken. In order to avoid any activity loss for companies and to provide an impetus for the trading of permits, the administration has decided to offer tax concessions, financial incentives and support funds. In addition to assistance measures and plans, there are compensation mechanisms to avoid a sharp rise in the quota prices. Unregulated proactive companies will therefore have the option to sell carbon offset credits; in other words, their efforts to reduce their GHG emissions may be used by regulated entities in order to prove reductions. However, it is important to emphasize that the use of carbon offsets will be subject to a quantitative and qualitative limit. Regulated companies will be allowed to use carbon credits for no more than a maximum of 10% of their compliance obligations. Only domestic credits resulting from external reduction activities implemented by non-ETS entities - and meeting international norms - may be used for compliance.

If these measures fail to limit the increase of the carbon value, the administration considers readjusting the quantity of quotas allocated. This measure will mainly allow to adjust to economic circumstances, should there be an unplanned change in the economic context. Most of the changes from economic theory stem from the desire to give more flexibility to market actors and to limit the economic

impact for regulated entities. These measures may limit the very efficiency of the ETS and shift part of the adjustment cost on civil society, but they have also allowed the Republic of Korea to initiate the control of its greenhouse gas emissions.

### **Prospects of development of the KETS**

At this juncture, it is important to note that the running ETS are among the main operational elements in the global climate policy. The creation of new ETS requires the determination of GHG emissions reduction goals. These commitments will offer evidence that countries are ready to limit their environmental impact and they will likely provide support to an international agreement at the COP 21 in Paris. The systems of Norway, Iceland and Liechtenstein have integrated the EU ETS, while Switzerland is expected to do so, and California and Quebec have merged their ETS, which suggests new interconnections in the future. This mechanism of system convergence supports their economic efficiency as well as their longevity and strengthens the countries' commitments. At the same time, it limits carbon leaks and competitiveness issues since the companies in partner countries are subject to the same carbon price.

Through the implementation of a domestic carbon market, the Republic of Korea participates to this dynamic. But there remains the issue of the selection of the adequate partner. The experience of the EU ETS may appear attractive, but the design of the future Chinese national ETS appears rather close to the KETS. However, in light of the size of these markets, the Korean system would risk getting absorbed without being able to influence the evolution of the prices of the ton of carbon. At this time, it is hard to imagine South Korea renouncing any sovereignty on its market. Conversely, a linkage to the Japanese system would create an imbalance at the

expense of the Japanese market. However, the issue of the partner is the subject of a wider analysis than simply market size. The choice is made on the basis of the systems' technical characteristics but also the price of the quotas likely to appear and the bargaining power that the Korean administration will enjoy after the linkage.



## **6. The Politics and processes of Creating Eco-City in South Korea: the Songdo International city**

**GUAHK YOUNGAH**

Over half of the world's total population is living in cities and this number will increase in the future. As a consequence, cities will play major role in the economic growth and job creation, but also will cause problems with massive urbanization, migration, air and water pollution, housing, and so on. A specific dimension of the trend to link urban growth, sustainable development and innovation in East Asia has been the creation of 'eco-cities', something that can be observed in all three major economies of East Asia. According to Roseland, eco-cities seek to achieve sustainable urban development through ecologically friendly land use and transport options so that inhabitants will reduce the private car usage.

Japan is promoting various environmental city projects including over twenty eco-cities since mid- 1990s. City projects named as 'smart city' by the Japanese central government are defined as a new type of city helping sustainable growth, reducing the burden on the environment and providing greater quality of life for the residents. China's

urbanization process is faster than in any other emerging economy and consequently it demands an enormous amount of natural resources. The Chinese government is taking climate change seriously and plans to implement an eco-friendly development and use of renewable energy sources and new materials. In the case of South Korea (hereafter Korea), the environmental protection issue was established in 2008.

### **Background of ecological and sustainable city development in Korea**

As can be seen in East Asia, each countries' or local cities' environment projects have branded themselves in many different way, for example as "Eco-city", "Smart-city", "Sustainable city", "Low or Zero carbon city", and "Green city". These are all labelled differently but share similar underlying assumptions that these cities are there to achieve a sustainable urban development, providing advanced technologies and contributing a better quality of life.

The modern concept of an environmental, ecological or sustainable living place got peoples' attention as early as the end of the 19<sup>th</sup> century as a 'garden city'. However, the exact term "eco-city" is a more recent development and it was first addressed by a US non-profit organization called "Urban Ecology" in 1980s. Still, the term eco-city was accepted as an innovative city concept with little practice, and the physical step forward was only taken at the 'Earth Summit' that was held in Rio de Janeiro, Brazil in 1992.

Korea signed the United Nations Framework Convention on Climate Change in 1993 and the Kyoto Protocol in 1998. Since, Korea began to frame and adapted the comprehensive plan (1999- 2007) for climate change. The greenhouse gas reduction was

recognized as one of the important issue during this period. In 2008, the central government publicized “Low Carbon Green Growth” and since then there are active movements on the diverse environmental projects such as ‘Climate Change Adaptation Model City Project’, ‘Eco-city Project’, ‘Low carbon green village project’, ‘Sustainable new town’ and more. These projects are jointly coordinated between central and local governments in Korea.

There are three different types of eco-city development. First, “New development” means that a city is built up from the scratch and the eco city policy was adapted from the planning stage. Incheon Free Economic Zone (IFEZ) area that contains three sub cities; Songdo, Yeongjong and Cheongna, and Dongtan residential town, furthermore Sejong special- autonomous city are examples of this category in Korea. Particularly, this development type is highly relying on the initiative, planning, implementation process and decision making from the central government. The second type of eco-city development is “Extension of urban area” that implies city is stretching and expanding to outskirts of the cities and build new eco-town or residential area in there. Ministry of Land, Infrastructure and Transportation (MoLIT) announced that the ‘Eco-Delta project’ is going to be implemented on the west-edge of Busan Metropolitan city, where plan to build new eco-friendly industrial area including harbour facilities and also the eco-town residential area in November 2014. The last category is “retro-fit” that requires the city is implementing the eco-city transformation from the existing setting. This category has wider arrangement of project type such as, water stream restoration project, eco-transportation policy, extending the forest area, low-carbon solar panel installation, free city bike campaign and more. Currently

a large number of cities are participating retro-fit type of eco city development in Korea such as Seoul capital city, Gwangju, Ulsan and Daejeon Metropolitan city and Jeju Special Self-Governing Province, Changwon, Suwon, Wonju, Naju, and others cities.

### **Creating an International City from Scratch: the Case of Songdo**

*The Evolution of the Songdo “Compact/ Smart/Green Grid” City Project*

Songdo is built on a man-made island located 65 kilometres southwest of Seoul, near the Incheon international airport. Songdo is the first foreign involvement in real estate acquisition carried out jointly by Korean and US companies. The first phase of the Songdo joint venture started in 2001, with approximately 25 billion USD of private investment, between Gale International, US and Posco Engineering and Construction of Korea. The foundation stone for Songdo was laid by President Roh, Tae-woo in 1988 when he visited Incheon during the presidential election campaign. However, the actual land reclamation started six years later after many struggles related to legal and economic issues. Initially, the Songdo project started as an ‘International City’ particularly targeting the trade business companies in East Asia and aiming to be completed by 2011.

As the Songdo project took off the Asian economy was hit by the 1997 Asian financial crisis. Early on in the Songdo construction process, the International Monetary Fund (IMF) became an important player in defining the nature of the project. In this context, the IMF urged the Korean government to declare the site as a free economic zone with strong intentions to attract foreign investment. Korean government agreed

and foreign investor together with Korean firms became stakeholders of the “Songdo International Business District”. Initially, the Korean government proposed Songdo as a Special Economic Zone (SEZ), which is an area designated to invite foreign investors providing the benefit of reduced or no taxation. This initiative eventually led to the adoption of the ‘Act on Designation and Management of the Free Economic Zones (FEZ) in Korea, December 2002. Songdo area was the first FEZ to become a specialised location for global and multinational businesses in Northeast Asia and the area is officially named as ‘Incheon Free Economic Zone’.

The important role played by the IMF in the development of Songdo is a sign that global actors have been influential actors in this process. However, the dependence on foreign investment caused further problems and delays when the US housing market collapsed, triggering the global financial crisis in 2008. In the aftermath of this crisis, foreign investment was more difficult to obtain and the branding of Songdo switched from the emphasis on the ‘international’ to a more ‘domestically- driven’ discourse about green growth. In early 2014, Songdo was officially re-named as “Songdo International City” in a move that re-called the original ambitions of its founders.

### *The Governance of Songdo*

Administratively, Songdo is a part of Incheon Metropolitan city, which is Korea’s 3rd largest city after Seoul and Pusan. Songdo was strategically planned through top-down decisions while its comprehensive urban planning was provided by international architectural firms to maximize the full use of geographical setting. Korea’s the first Free Economic Zone, which was effective as of July 2003, is designated in Incheon

(IFEZ) includes Songdo, Cheongna and Yeongjong. Thus including Songdo, the IFEZ was given a partial territorial exemption from the Korean state’s regulatory power, for example, exception for the state and local taxes, public property lease and etc. The Songdo project is unusual, especially when it is compared to the concept of past ‘state-led’ urban developments in Korea. The Songdo joint venture between Gale International and Posco was possible after the Korean government passed legislation to allow foreign real estate’s acquisitions. The Incheon municipal government and the central government of Korea jointly provided a substantial share of the budget for the infrastructure and utilities of the project for instance, financing the 10km bridge connecting Songdo and Incheon International Airport. Deregulation was also the one of the crucial measures being agreed at that time, requiring action by both the central government and by local actors. In addition, government encouraged a “good business climate” by offering incentives for the foreign investors and multinational corporations.

### *The Role of Different Mayors of Incheon*

In terms of local politics, the first Incheon mayor involved with the Songdo project was Ahn Sang-soo from then Grand National Party (current Saenuri Party). During his two terms as an elected Incheon mayor (from 2002 to 2010), he was the key person for the direction and planning of Songdo project. For example, Mayor Ahn appointed the director and the staff of the Incheon Free Economic Zone (IFEZ), who were mainly seconded from the Incheon metropolitan government. Mayor Ahn strongly believed in the success of the Songdo project and his objective was to establish a “Compact/ Smart/Green Grid city”. However, he also faced severe criticisms regarding the local

budget deficit that rose from \$128.24 million to \$6.18 billion at the end of his 8 years of term.

In detail, Incheon metropolitan city is supposed to have a sufficient ratio of self-reliance, which means share of debt over the local fiscal budget. In 2003, this share was, for example, 17.5 %. However, this ratio increased to 37.1% in 2010. The central government designated 40 % as the bar and encouraged the local government to not exceed this rate. Media have mainly criticized Mr. Ahn's excessive development plans and large construction projects in Incheon city including IFEZ new development. Eventually, Mr. Ahn was defeated during the 2010 local election and a new mayor was elected from the then opposition Democratic Party. The newly elected mayor from, Mr. Song, Young-gil was more liberal, he promised to prioritize reducing the fiscal budget deficit and therefore did not start any mega construction projects. Instead, Mr. Song focused on the existing on-going construction projects of the Incheon city. He also announced the reduction in the scope of the Songdo project by, for example, stopping the building of the planned Songdo International Hospital and of the Songdo Landmark City Tower, a 151-floor planned construction project. Despite the effort in reducing the scope of the IFEZ project and limiting the construction plan in Incheon city, the budget deficit problem was not solved during his four-year term.

Mayor Song was also actively involved with the international recognition of Incheon city, for example he successfully prepared the Asian Games 2014, and also attracted the Green Climate Fund to locate its office in Songdo. However, he lost the next election to the Saenuri party candidate. Yu Jong-bok started his term as Incheon mayor on 1<sup>st</sup> July 2014. It is still early at this point to

make judgments about Yu's impact on the project, and he did not make specific public promises related to Songdo during his election campaign. The general expectation is, however, that he will take a more positive attitude towards the further development of the real estate market and the evidence for that is the green light he gave to the Songdo international hospital, which was halted by the previous mayor.

## **Sustainable Development in Songdo**

The Songdo construction project is aiming to be completed by 2022. However, the first residents moved into the city already since 2009. As of June 2015, Songdo has more than 86.000 inhabitants, living in three different administration areas (called "Songdo-dong 1, 2 and 3"). Songdo has been branded and promoted as a 'sustainable', 'green' or 'eco-friendly' city in its publicity since 2007.

However, Songdo is not only designed to be an 'eco-city'. Even before the eco-city branding, Songdo declared itself to be the first 'ubiquitous city' in 2006. The ubiquitous city or U-city is a city that provides facilities where residents can find information and use administrative recourses, welfare, transportation and the environment conveniently without time and place limitation. . The network in the Songdo is developed by Cisco. The combination of eco city and Ubiquitous city created the term 'u-eco-city' and it attempted to contribute to the 'Green Korea' project. However, scholars have argued that the ecological elements of city are more visible than the ubiquity elements. This city has been labelled as 'smart, sustainable and technologically ambitious'. According to their white paper Sustainable Design Songdo IBD, the city sets out the six core development goals:

- Open and green space (access to nature, sunlight, healthful recreation, public gathering spaces)
- Transportation (multi-modal transportation including walking and biking, clean energy)
- Water consumption, storage, and reuse (reduced water use, storm-water and grey-water recycling, green roofs to reduce runoff, mitigate heat island effect, and provide native species habitat)
- Carbon emissions and energy use (ASHRAE standards, solar energy generation, LED traffic lights, reduced energy use, pneumatic waste collection)
- Material flows and recycling (construction waste recycling, locally produced materials)
- Sustainable city operations (recycling guidelines, no-smoking policy in public areas)

Songdo seems to be developing according to these core development goals. First, regarding the 'open and green space' goal, Songdo boasts the highest green area ratio (32 %) in Korea, including several parks in the city (e.g. Songdo Central Park, Penta Park, Haedoji, Park and Michuhol Park). Second, Songdo also built a domestic waste facility to collect waste, separate flammable substances, and uses it as fuel. This can also be sold to local heating corporations or to the Korea Electric Power Corporation (KEPCO) and thereby produce revenue. An additional gain could also be generated by selling carbon credits. Songdo furthermore promised that renewable energies such as solar power and geothermal energy would be implemented in near future. Third, Songdo is also focused on the recycling of water for use and reuse. The city will complete the construction of resource circulation system that collects rainwater to use for road cleaning and water for parks in this year. The sewage recycling system

that cleans water after daily use for reuse in toilets inside the buildings is the 1<sup>st</sup> phase of this operation. Fourth, Songdo has a total of 127 km of bicycle paths in the city. The paths are planned from the beginning of the city design therefore ensuring that the bicycle path is integrated and connecting almost all the part of the Songdo. Furthermore, Songdo city also offers free of charge bicycles for both residents and visitors to rent and ride within the city. Lastly, Songdo is targeting certification under the LEED (Leadership in Energy and Environment Design) rating system, which is organized by US Green Building Council, for its business complex area.

Still, one needs to realise that the eco-project is on going and can only be evaluated at the end of the completion of construction. However, the marketing of Songdo as a green city has gone ahead and it demonstrates how the real estate sector and government actors modify representations to adapt to the changing economic, political, and social conditions – moving away from the previous reliance on the 'international' dimension of the project which had become difficult in the wake of the global financial crisis. Instead, the Korean government's initiatives and regulations played an important role in branding Songdo as a 'green city'. For Songdo, it added an additional attraction for potential business investors and for the public. To add this greenness to the city, the central and local governments offered extra financial benefits for developers and relevant industries.

## Conclusion

This brief examination of the Songdo project has demonstrated a number of important aspects of the development of an eco-city in Korea. First, we have seen how multiple levels of governance have had an influence

on the developments in this case. Second, we have seen the influence of local actors in the way in which different mayors of the city of Incheon have been engaged with the project. Third, one has to recognise the limitations of this single-case study and the difficulty of drawing wider conclusions from it for Korea. Not only is the Songdo International City an on-going project and an unfinished process that has not yet settled into a final pattern of urban governance, but it also remains an exceptional project in the context of Korea. Last, this article has demonstrated that the driving forces behind the establishment and development of an eco-city in Korea are more political than ecological.