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KOREA'S GREEN GROWTH STRATEGY: A WASHINGTON PERSPECTIVE

By Haeyoung Kim

When the global financial crisis tore through world economies, national budgets around the world were immediately funneled to stabilize and revive the energy-intensive industries impacted by the market maelstrom. Yet, the Republic of Korea (ROK) saw the fiscal downturn as an opportunity to invest in new engines to power its economic growth. In a 2008 national address commemorating the 60th anniversary of Korea's liberation from Japanese colonial rule, South Korean president Lee Myung-bak announced a "low carbon, green growth" vision for his country's economic future.

"The ROK government aims by 2020 to reduce countrywide emissions by 30 percent relative to a business-as-usual baseline, which is 4 percent below 2005 levels and a near doubling of the recommended targets set by the international community."

A year later, the government introduced the National Strategy for Green Growth, and in January 2010 South Korea's National Assembly passed the Framework Act on Low-Carbon Green Growth, codifying a 50-year plan to address climate change and achieve greater energy independence without compromising the country's economy. Sharing a common commitment to decarbonize, the United States and the ROK have also cooperated around developing clean-energy technologies, establishing new features to a long-standing alliance relationship. Although skepticism around the details of low carbon, green growth remain, particularly megascale power generating projects and a proposed carbon-trading system, Seoul has made considerable efforts in recent years to back green growth.

The ROK's National Green Growth Vision

As the global community turns its attention to climate change and clean energy, the world's 12th-largest economy has taken aggressive steps to lead the effort. Seoul pledged to earmark 80 percent of its $38 billion postcrisis stimulus package and 2 percent of its annual budget over the course of five years to advance green growth.[1] According to the United Nations Environment Program, the ROK has dedicated the highest proportion among comparable country members of the Group of 20 (G-20) of its fiscal stimulus package to green projects and is setting aside double what most other G-20 states have as a percentage of GNP.

The ROK government aims by 2020 to reduce countrywide emissions by 30 percent relative to a business-as-usual baseline, which is 4 percent below 2005 levels and a near doubling of the recommended targets set by the international community. The nation also calls for 6 percent of its energy needs to be met by wind, solar, and other renewable sources—a significant increase from the modest 1.68 percent of renewables used today. Classified under the Kyoto Protocol as a non–Annex I party, or a developing economy, the ROK is not bound by emissions targets.[2] Nevertheless, Seoul has voluntarily undertaken zealous efforts to reduce carbon emissions.

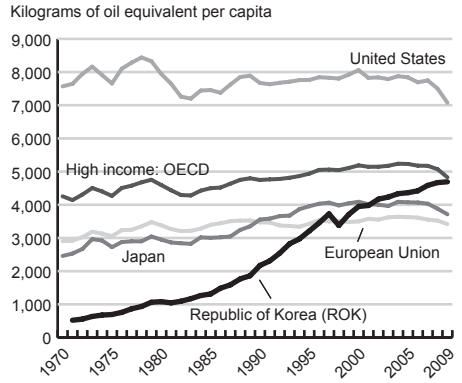
The ROK's goals are indeed ambitious given that the country's current level of energy consumption and carbon dioxide (CO_2) emissions rank among the highest in the world (***Figure 1***). The country is the 10th-largest world energy consumer, 5th-largest global crude oil net importer, and the 2nd-largest buyer of liquefied natural gas and coal. Among OECD countries, the ROK is the 9th-largest emitter of CO_2, and its greenhouse

1. In comparison, the United States dedicated 11.6 percent of its $972.1 billion stimulus package to green technology, while Japan dedicated 2 percent of its $485.9 billion package to the same.

2. Given South Korea's status when the Kyoto Protocol of the United Nations Framework Convention on Climate Change was being negotiated, the country was classified as a non–Annex I party.

gas emissions growth rates are the highest in the last two decades, nearly doubling from 298 million tons in 1990 to 594 million tons by 2005.

Figure 1: **Energy Use in Selected Countries and Areas, 1970–2009, kilograms of oil equivalent per capita**



Sources: World Development Indicators, World Development Finance, World Bank, Washington, D.C., various years.

Efforts to diversify energy sources will require a fundamental transformation of the ROK's consumption patterns. In 2008, oil accounted for nearly 50 percent of the country's total consumption mix, nuclear power nearly 30 percent, coal 7 percent, natural gas 12 percent, and renewables roughly 2 percent of total usage.[3] With 57 percent of these resources consumed in heavy industry, a shift from energy-intensive sectors to low-carbon ones will undoubtedly be necessary. However, given that South Korea is the global leader in shipbuilding and is the fifth-largest steel and auto producer and that heavy industry accounts for 30 percent of overall GDP, reaching reductions targets will be no easy feat.

Cost of Rapid Development

Since the de facto end of the Korean War in 1953, the ROK has pursued an enthusiastic postwar reconstruction effort focused on industrialization, urbanization, and export-driven economic growth. Over a relatively short period of time, the country has experienced profound economic shifts. From a donor-dependent, war-torn country, South Korea transformed itself into a leading global economy. Annual per capita income increased from $100 in 1960, to $1,674 by 1980, $10,884 in 2000, and $27,560 in 2010.[4]

Unfortunately, the industry-focused growth paradigm that enabled the ROK to spectacularly emerge from poverty also entailed massive environmental costs. The Han River, which flows through Seoul, once doubled as the city's sewage line and was inundated by unregulated dumping of large-scale industrial waste. The country's other major rivers—the Nakdong, Yeongsan, and Geum—did not fare much better. In fact, water quality was so severely damaged during the period of intense industrialization that these rivers failed to meet the minimum standards of potable water for the related metropolitan areas. Not until the late 1980s, in advance of hosting the Olympics in 1988, did the government begin in earnest to revive the health of its major rivers.

With a dramatic increase in energy consumption to power developing industries, air pollution in Seoul also reached record levels. From 1966 to 1975, petroleum consumption increased from roughly 15,000 barrels to 105,000 barrels per day. During that same time, coal consumption nearly doubled from 10 million to 20 million tons per year.[5] The burgeoning use of motor vehicles also made significant contributions to the nitrogen dioxide, sulfur dioxide, and carbon dioxide levels in the air—pollution levels that have steadily increased ever since (***Figure 2***). Rapid postwar development efforts in a resource-scarce, densely populated, geographically small country placed enormous pressure on the ROK's ecosystem, a heavy price to pay as the country emerged as a leading Asian Tiger economy.

Environmental Politics in Postwar Korea

During the period of authoritarian rule in the 1960s and 1970s, the ROK government pursued rapid modernization with few, if any, environmental controls. Emerg-

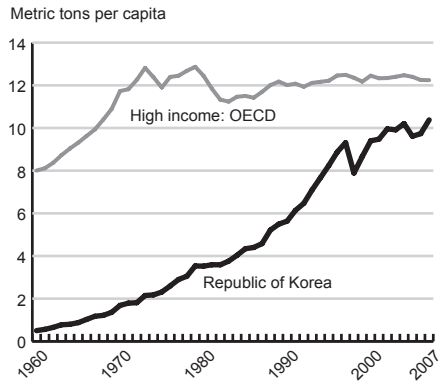
3. Statistics and Balances (database), International Energy Agency, Paris, http://iea.org/stats/.

4. International Financial Statistics–Country Tables, International Monetary Fund, Washington, D.C., www.imfstatistics.org/imf.

5. Korea National Statistics Office, www.nso.go.kr.

ing environmental groups were severely repressed, seen as antigovernment, and often targeted as leftist agitators. The constant state of postwar alert led the ROK to clamp down tightly on groups considered, if even remotely, to be associated with leftist forces. Concerned with protecting their image and obsessed with growth, authoritarian governments even went so far as to discount development-related environmental disasters.[6] A monument in Ulsan, a fishing village turned industrial mecca in the late 1960s, is inscribed with the following Park Chung-hee quotation, which captures the zeitgeist of the developmental state: "Black, dark smoke rising from factories show promise that our nation will prosper."

Figure 2: **Carbon Dioxide Emissions in the Republic of Korea and in OECD Countries, 1960–2007, metric tons per capita**



Sources: World Development Indicators, World Development Finance, World Bank, Washington, D.C., various years.

Yet, as industrialization surged forward and environmental impacts followed, citizen groups began voicing concerns about deteriorating environmental, ecological, and public health–related conditions accompanying major development projects. Emerging alongside other social movement groups during the era of democratization in the late 1980s and 1990s, environmentalists started calling for better environmental protections, including regulations on toxic industrial waste and air pollution. Planned construction projects were challenged, and popular protests eventually began to compel the government to take more environmentally conscious action. In 1990, more than 20,000 citizens protested successfully against a leaked government plan to construct a nuclear waste disposal facility on Anmyeon-do, an island off of the peninsula's west coast.

With environmental concerns increasingly becoming a part of the public consciousness, during the 1980s and 1990s the ROK government began the steady introduction of new domestic environmental laws and the strengthening of existing laws. ROK presidents also began joining international agreements, such as the Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol on Substances That Deplete the Ozone Layer, and the United Nations Framework Convention on Climate Change, to name a few.

President Lee Myung-bak's green growth strategy is, however, the first time an ROK administration has linked domestic economic growth policies with environmental considerations. His approach rests on the premise that significant, real reductions in domestic greenhouse gas emissions need not curtail the country's economic growth; in fact, the strategy proposes that investing in the development of new and renewable energy sources can create jobs and spur the economy while bringing the country closer to an energy secure future. Given the country's history of sidelining and providing minimal budgetary support for environmental issues, low carbon, green growth is a welcome departure from development approaches of the past.

Shades of Green

As the international community lauds the ROK's recent efforts, hailing the country as a leader in the field of green growth, local environmental groups have been less than impressed. Critics argue that the national policy misses the mark in terms of environmental friendliness. Large-scale civil engineering projects and the construction of nuclear power plants—cornerstones of the green growth strategy—have provoked debate over what truly qualifies as "green."

6. To be sure, government official attempts to cover up environmental crimes and disasters were not limited to postwar industrialization efforts. In 1991, eight Doosan plant officials dumped 325 tons of waste phenol, a substance known to cause cancer and affect the nervous system, into the Nakdong River, the potable water source for roughly 10 million people. The plant officials were arrested, as were seven government officials who tried to conceal the incident to protect the company.

A central feature of the government's green growth platform is the Four Rivers Restoration Project, a massive river management scheme costing 22.2 trillion *won* ($20 billion) or 8 percent of the ROK's annual budget. By dredging and damming four major rivers, the government hopes to increase the freshwater supply, improve water quality, and stave off flood risks. Ecologists have noted that dredging 570 million cubic meters, constructing 22 large weirs and 16 new dams, and lining 151 miles of riverbank with concrete will merely lead to tremendous ecosystem degradation. Studies show that the natural habitats of riverine species and 50-some different types of migratory birds will be eroded, and restricting the natural course of rivers goes against widely accepted environmental policies that protect river health. Many South Koreans also believe that the planning process has been undemocratic, with few public hearings, hastily conducted environmental impact assessment reports, and a dismissive government attitude toward the concerns raised by citizens and environmental interest groups. Public opinion polls conducted since 2008, when the project was first announced, have consistently shown that a large majority of South Koreans, as high as 70 percent, oppose the project.[7]

The government's green growth plan also entails heavy investment in nuclear power, a low-carbon energy source not always regarded by critics as green, given its associated environmental disadvantages. Seoul has targeted a doubling of nuclear energy consumption by 2030, from 29 percent of total national electricity-generating capacity to 59 percent, driven by the construction of 10 nuclear plants alongside 7 that are currently being built and 21 already in operation. The country has also become a major nuclear technology exporter, securing in December 2009 a $20 billion contract to develop civil nuclear power plants in the United Arab Emirates. The increasing use of nuclear energy and the concomitant production of nuclear waste have distressed South Koreans. Especially given the recent disaster at the Fukushima Daiichi plant in Japan, concerns about the safety of handling, processing, and storing spent nuclear fuel and the placement of nuclear power plants and waste disposal facilities have come to the fore.

Greening the Marketplace

Environmental groups in South Korea have, however, given their stamp of approval to other aspects of the government's "Green New Deal." Seoul has developed stricter building insulation and energy efficiency standards, and South Korean firms have mastered the production of advanced light-emitting diodes (LEDs), a low-energy technology that is to replace incandescent light bulbs, which will be banned by the end of 2013. The introduction of energy conservation campaigns, advancement of renewable energy sources, and development of low-carbon technologies have been greeted by the green community enthusiastically.

The ROK has also developed a plan to fully integrate a smart grid system by 2030 in an effort to reduce carbon emissions and increase efficiency in energy distribution. The smart grid will apply two-way communication technology between consumers and suppliers on the nation's current power-transmission grid, allowing for an interactive exchange of real-time usage and price data. Through enhanced monitoring, the government hopes to optimize energy efficiency and provide consumers with cost incentives to reduce use. The smart grid will also support power feed-in from renewable energy sources, such as solar panels at the consumer end, helping to facilitate the increased supply and use of cleaner energy. Smart grid technology is projected to decrease national electricity consumption by 6 percent and national greenhouse gas emissions by 4.6 percent. In November 2010, 600 households were connected to a smart grid pilot project on Jeju-do, an island off of the southern end of the peninsula, with plans to connect up to 6,000 households by 2013.

With smart grid development efforts taking shape in the United States, Seoul and Washington have focused on establishing partnerships between the public and private sectors to develop, test, and implement smart grid technologies. In April 2009, the U.S. Department of Energy and the Korean Ministry of Knowledge Economy (MKE) signed a statement committing to collaborate on expanding and promoting smart grid–related research and development. The agreement also expressed a desire to enhance bilateral cooperation

7. "Four-River Project," *Korea Herald*, 13 December 2008; "Rein in the Rivers Project," Yonhap, 2 October 2009; Marcia McNally, "Korea's Grand Plan: Dams and Canals to Restore Ecosystems," *World Rivers Review* 24, no. 3 (2009); Je-hae Do, "Foreign NGOs Brings 4-Rivers Plan Positive Spin," *Korea Times*, 9 February 2010.

between universities, research institutes, and private sector companies. Since then, MKE and the Illinois Department of Commerce signed a memorandum of understanding in January 2010, pledging to develop and deploy commercially viable technologies in Illinois and the ROK. In February 2011, South Korea's state-owned power company, the Korea Electric Power Corporation, joined IBM's Global Intelligent Utility Network Coalition, signaling the country's intent to promote smart grid technology adoption worldwide.

The ROK is also leading the charge to develop advanced lithium-ion batteries, the foundation of electric cars. The Ministry of Educational Science and Technology recently launched the Battery 2020 Project, aiming to build research and development capabilities and pool private sector funds to gain a foothold in this market. LG Chem, the leading South Korean chemicals maker, recently cut the ribbon on the world's largest plant in Ochang, South Korea, which is reportedly equipped to produce lithium-ion batteries for 100,000 vehicles annually. The United States and the ROK have also partnered to drive an electric vehicle revolution. With U.S. president Barack Obama pledging to roll out 1 million U.S.-made hybrid vehicles onto American roads by 2015, General Motors selected LG Chem to be its primary supplier of lithium-ion cells for GM's Chevrolet Volt. The Chevy Volt is a plug-in hybrid electric vehicle (HEV) with an extended range that can drive up to 40 miles in battery-electric mode. LG Chem also broke ground last summer on a Michigan-based facility to produce batteries for other HEVs in the United States, prompting a visit by President Obama to welcome the battery plant and cementing a new dimension to the ROK-U.S. alliance.

One of the country's most promising programs to curb greenhouse gas emissions is the carbon-trading system envisioned in the Framework Act on Low-Carbon Green Growth. Recently, however, the initiative suffered a setback. In March, the MKE, backed by the Federation of Korean Industries, succeeded in delaying implementation of the ROK's carbon emission trading system to 2015, over the objections of the Blue House Commission on Green Growth. The delay will severely restrict the government's ability to meet its midterm greenhouse gas reduction target of 4 percent below 2005 levels by 2020. Industry leaders justified the delay in a statement issued at the end of February, noting that implementation would reduce their competitiveness since other countries—namely the United States, China, India, and Japan—have postponed or withdrawn country-specific carbon-trading schemes.

A Global Green Economic Future

At the international level, the ROK has played an increasingly important role in advancing global agreements. The country was instrumental in the adoption by the Organization for Economic Cooperation and Development (OECD) of the Declaration on Green Growth, and an ROK proposal—a registry for developing countries to inscribe their climate change mitigation activities—became a key component of the Copenhagen Accord developed at the United Nations Framework Convention Conference of the Parties in December 2009. With the ROK's emergence as an important aid donor, Seoul has issued no- to low-interest loans to fund green projects overseas, most recently $35 million to Mozambique to support solar power plants and $600 million to Indonesia to finance development efforts that will include green industry. South Korea and Denmark also signed a Green Growth Alliance in May 2011 to reinforce cooperation between government agencies, universities, and the private sector from both countries.

In the longer term, the ROK has also established the Global Green Growth Institute (GGGI), a global nonprofit think tank dedicated to promoting economic growth in environmentally sustainable ways. Linking advanced nations, developing countries, leading scientists, and climate change experts, the GGGI allows for best-practice sharing and capacity building to address environmental problems and offer support to global green growth efforts. Headed by Richard Samans, a former White House official during the Clinton administration and former managing director of the World Economic Forum, the GGGI currently oversees several projects with partner countries and, most recently, arranged to send experts to the United Arab Emirates to help establish low-carbon green growth strategies. The GGGI is also scheduled to open an office in Abu Dhabi to act as a hub for the Middle East and North Africa.

The "Miracle on the Han" seems to be paving the way toward a global green economic future, offering the international community guidance on green growth. Certainly, a renewed focus on the environment is nec-

essary as temperatures continue to rise, weather conditions remain extreme, ecosystems become increasingly threatened, and pollution presents a serious public health risk. In this regard, the ROK has demonstrated remarkable leadership by throwing its financial muscle behind green efforts, setting ambitious greenhouse gas emissions reductions targets and other commendable national goals. It remains debatable, however, if other efforts like the Four Rivers Restoration Project and the expansion of nuclear energy use promotes sustainable green development. In hoping to minimize environmental impacts without compromising economic growth, Seoul may choose to consider a more developed renewable energy industry rather than megascale power-generating projects or additional demand-side management strategies and other energy conservation measures. Implementing the proposed carbon-trading scheme would also have a significant impact, but Seoul will need to stand firm in the face of business and industry pressure to delay the initiative. Indeed, with environmental externalities in even the most well-intentioned of development plans, the jury is still out on whether the excitement surrounding the government's low carbon, green growth vision will yield environmentally sustainable results.

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