

The U.S.-ROK Alliance: A Catalyst for Green Growth?



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Introduction

In the 18 months since Korean President Lee Myung-bak unveiled his National Strategy for Green Growth, Korea has moved aggressively to style itself as a leader amid the global push to de-carbonize. In a significant move for a country with no obligations to reduce greenhouse gas emissions under the Kyoto Protocol, President Lee announced last November an emissions reduction target of four percent below 2005 levels by 2020 (or 30 percent below the business-as-usual level). The Presidential Committee on Green Growth, formed at Lee's behest, is now pushing for a national cap-and-trade law to limit CO₂ emissions and create an emissions trading scheme and a national greenhouse gas inventory.

Through a series of high-level conferences, the government has courted presidents, ministers, and business leaders from around the globe in an effort to foster cooperation that could contribute to Korea's green growth goals. Korea has dedicated a higher percentage of its economic stimulus package to green growth than any other country (79 percent).¹ Last November, Korea became the first Asian country to join the Asian Development Bank's Future Carbon Fund, with a commitment to acquire \$20 million worth of post-2012 carbon credits.² In December, President Lee announced the upcoming launch of the Green Growth Global Institute, intended to be a "global think tank and bridge between advanced and developing countries."³

On January 13, 2010, following approval by the Korean National Assembly, President Lee signed the Basic Law on Low Carbon and Green Growth, formally codifying the framework for a sweeping national strategy designed to transform the Korean economy into an engine of "green growth" over the next four decades. The law is expected to take effect this spring, and it is backed by a government pledge to spend two percent of annual GDP in support of its objectives.⁴

¹ "Global Green New Deal: An Update for the G-20 Pittsburgh Summit," United Nations Environment Program report, September 2009,

<http://www.unep.ch/etb/publications/Green%20Economy/G%2020%20policy%20brief%20FINAL.pdf>

² "Korea Joins ADB's Future Carbon Fund with \$20 Million Commitment," press release, Asian Development Bank, November 13, 2009, <http://www.adb.org/Media/Articles/2009/13063-asian-carbon-funds/>

³ "Seoul to Launch Global Institute on Climate Change in Early 2010," *Yonhap*, December 18, 2009.

⁴ Cho Meeyoung, "South Korea to spend \$85 billion on green industries," *Reuters*, July 6, 2009.

Money alone—even a willingness to spend 107 trillion won (\$84.5 billion) over five years as Korea has pledged to do—will not achieve green growth. Beyond financial resources, achieving green growth requires the right incentives, resources, technological know-how, consumer education, and private sector buy-in. Korea’s assertive energy diplomacy—designed to secure some of these—is essential to its green growth vision. Therein may be an opportunity for the United States and Korea to develop a new facet to their alliance relationship.

The Presidential Committee On Green Growth

In 2020, when the world thinks of Korea, President Lee Myung-bak hopes that it will also instantly think “green.” On August 15, 2008, in a speech marking the 60th anniversary of the founding of the Republic of Korea, President Lee introduced a new national vision called “Green Growth.” He explained that “green growth refers to sustainable growth that mitigates greenhouse gas emissions and prevents environmental degradation. It is also a new national development paradigm that creates new growth engines and jobs through green technology and clean energy.”⁵

The green growth vision seeks nothing less than a transformation of the very foundations of Korea’s economy and infrastructure. Its underlying assumption is that economic growth and environmental protection are compatible, and even mutually reinforcing. It aims to remake Korea’s image into a “global green leader” that will create cutting-edge clean energy technology and assist developing countries in pursuing green growth.

For the Lee administration, green growth is much more than a vision. It is a long-term, top-down national strategy, complete with a five-year plan and a brand new presidential committee to implement it. Reflecting the scope of the vision and the government’s central role in pursuing it, the administration created the Presidential Committee on Green Growth to implement the national strategy and revived the practice of five-year economic plans, which were instrumental in the country’s post-1960 development into an industrial powerhouse.

With the government at the center to provide policy direction, funding, and incentives for economy-wide green investments and lifestyle changes, the National Strategy for Green Growth contains three overarching objectives: 1) effective climate change mitigation and energy independence; 2) new engines for economic growth; and 3) improved quality of life in Korea and enhanced international standing.

The Korean government plans to spend 107 trillion won (\$94.7 billion) on green growth as it implements the first five-year plan (2009-2013). This translates into 2 percent of its annual GDP—twice the amount recommended by the United Nations Environment Program. The first five-year plan—a veritable full-court press toward achieving Korea’s objectives for green growth—includes measures as diverse as introducing a carbon

⁵ Speech by President Lee Myung-bak on August 15, 2008, cited in “Korea’s Future in Green Growth,” a report of the Presidential Committee on Green Growth.

trading system and promoting the use of bicycles as a “green” transportation alternative. Other plans include a target cap on greenhouse gas emissions; intensive R&D efforts in green energy technology; a smart grid pilot project; creation of a “Green Corps” to promote engagement in green growth activities overseas; and wide dissemination of educational materials on living a green lifestyle. An expansion of nuclear power also figures prominently in the government’s greenhouse gas mitigation plans, as it will take some time to ramp up efforts in other areas.

Green Growth Or “Greenwashing?”

Despite efforts to frame his national strategy for green growth as a pan-Korean initiative in the willing embrace of government and society, President Lee still has some convincing to do. His attempts to marshal public support for his vision sound more like a directive than an appeal. “It is time for each person to act,” he said recently. “I hope South Korea will take the lead in this field.”⁶

The green growth vision is not backed by unanimity of opinion within the Korean government, or among key industry players, on how quickly the national strategy can or should be implemented. After the government announced mandatory energy savings targets for top firms last October, Knowledge Economy Minister Choi Kyoung-hwan exposed a rift between the government’s goals and the business community’s concerns. In public remarks he said, “[The government] has to check how many jobs will be reduced and how the country can maintain the competitiveness of key industries, as well as whether players designated for the carbon reduction have reached consensus toward the goal first.”⁷ Some industry leaders have echoed this sentiment. The Ministry of Knowledge Economy asserted that hearings will be held before firms are subject to the new rule.

Some in Korea’s environmental movement are also critical of the green growth plan, claiming that the government is “greenwashing,” or simply recasting existing projects as “green.” Half of Korea’s stimulus package—\$20 billion—is being spent on the “four rivers restoration project,” a plan to re-engineer four major river systems to prevent flooding and conserve water.⁸ It is the object of scorn for a number of Korean environmentalists. Choi Yul, a leading environmentalist in Korea, told the *Christian Science Monitor* that the project “is not revival, it means death for the rivers. This is fake green growth.”⁹

Furthermore, the government’s investments outside of the green growth strategy underscore the reality that securing reliable supplies of traditional fossil fuels will remain a necessity for Korea for some time. For example, the Ministry of Knowledge Economy announced a record \$12 billion investment in overseas resource development planned for

⁶ “Gov’t unveils action plan for ‘green growth,’” *Yonhap*, February 4, 2010.

⁷ Cho Chung-un, “Minister cautions against Seoul carbon plan,” *The Korea Herald*, October 31, 2009.

⁸ Peter Ford, “S. Korea goes ‘deep green’ – or does it?” *Christian Science Monitor*, October 25, 2009.

⁹ *Ibid.*

2010. This includes acquiring foreign energy companies and purchasing stakes in oil and gas fields.¹⁰

Still, the green growth strategy encompasses much more than the four rivers project, and by publicly pushing it, the government is creating expectations for Korea. President Lee is no doubt cognizant of shaping public perceptions of Korea's green growth goals. "The world is paying attention to the South Korean government's positive vision for (achieving) economic growth while combating climate change," he said recently.¹¹ He has also been unequivocal in acknowledging the public image benefits of announcing voluntary cuts in greenhouse gas emissions. "Our ambitious target will help enhance the country's international status and national pride," he said last November.¹² South Korea's ambassador for climate change, Chung Rae-Kwon, has said that Korea's emissions reduction goal could serve as a role model for developing countries.¹³

Korea's rapid industrialization and remarkable economic growth since 1960 have come at a price: Korean industry consumes more than 50 percent of all of the energy used in the country each year,¹⁴ contributing to the country's ninth-place ranking among G-20 nations in overall carbon emissions and its seventh-place ranking in per capita emissions.¹⁵ While total carbon emissions from the Republic of Korea are small (129.6 million metric tons in 2006) compared to large emitters such as China (1.66 billion metric tons) or the United States (1.56 billion metric tons), the growth rate in Korea's carbon output outpaces that of many other countries.¹⁶ It more than doubled between 1990 and 2007.¹⁷ Korea's rate of emissions growth was faster than any other member of the Organization for Economic Cooperation and Development between 1995-2005.¹⁸ Furthermore, Korea is almost wholly dependent on imports to meet its energy demand. It is the second largest net importer of coal and the fifth largest net importer of crude oil in the world.¹⁹ Fossil fuels make up 84 percent of the country's energy mix (nuclear accounts for 14 percent and renewables two percent).²⁰

¹⁰ "S. Korea to Invest Record US\$12 BLN in Overseas Resources Development in 2010," *Asia Pulse*, January 19, 2010.

¹¹ "Gov't unveils action plan for 'green growth,'" *Yonhap*, February 4, 2010.

¹² "S. Korea adopts ambitious target for emissions cuts," *Agence France Presse*, November 17, 2009.

¹³ "South Korea Plan Could Help Solve Impasse at Climate Talks: Official," *Asia Pulse*, December 18, 2009.

¹⁴ Jane Han, "Top Firms Required to Save Energy From 2010," *Korea Times*, October 25, 2009.

¹⁵ Data from the Carbon Dioxide Information Analysis Center cited on Washingtonpost.com, The Climate Agenda, <http://www.washingtonpost.com/wp-srv/special/climate-change/index.html>

¹⁶ Ibid.

¹⁷ Yvonne Chan, "South Korea reports CO2 output more than doubled since 1990," BusinessGreen.com, October 13, 2009.

¹⁸ Christian Oliver, "South Korea: New Development bites the hand that feeds ecotourism," *Financial Times*, September 21, 2009.

¹⁹ "Key World Energy Statistics 2009," International Energy Agency report, http://www.iea.org/textbase/nppdf/free/2009/key_stats_2009.pdf

²⁰ Energy Information Administration, U.S. Department of Energy, "Country Analysis Briefs, South Korea," http://www.eia.doe.gov/emeu/cabs/South_Korea/Background.html; and "Korea's Future in Green Growth," a report of the Presidential Committee on Green Growth.

Clearly, there would be some painful economic adjustments to make if Korea were expected to take on mandatory emissions reduction commitments. Pre-empting that day may be an underlying factor in pursuing the green growth strategy. Classified as a developing country under the United Nations Framework Convention on Climate Change (UNFCCC), Korea has no mandatory commitments under the Kyoto Protocol. By announcing voluntary emissions reduction targets, Korea may be seeking a head start in anticipation of impending reclassification as a developed economy and the mandatory commitments that accompany such status. Whatever its motivations, the Presidential Committee on Green Growth is forging ahead with plans to develop a nationwide smart grid by 2030, deploy electric vehicles on a commercial scale, and build or convert two million green buildings. If the green growth gamble does not pay off, it will not be for lack of imagination.

A Nationwide Smart Grid By 2030

It is no accident that Korea, along with Italy, was chosen to co-author the Technology Action Plan on Smart Grids for the Major Economies Forum on Energy and Climate Change (MEF), a grouping of 17 major economies who meet periodically outside of the UN framework to discuss actions on increasing renewable energy and cutting emissions.²¹ In the 18 months since President Lee first announced the National Strategy on Green Growth, the momentum behind developing a nationwide smart grid has accelerated, giving rise to many of the requisite institutions. Launched in May of 2009, the Korean Smart Grid Association has now grown to 100 members. Last June, the Association signed a Memorandum of Understanding with its U.S. counterpart to cooperate on smart grid technology development and investment. In July, the MEF designated Korea as a lead country in smart grid development. In August, the Ministry of Knowledge Economy launched the Korea Smart Grid Institute. That same month, ground was broken on a smart grid pilot project on the island of Jeju.

The government estimates that implementing a nationwide smart grid will help Korea reduce power consumption by 3 percent, cut greenhouse gas emissions by 150 million tons, generate 74 trillion won (\$65 billion) worth of demand for new products and services, and create 50,000 new jobs.²² But first, an investment of 27.5 trillion won (\$23 billion) is required from the government, with 24.8 trillion won (\$21 billion) expected from the private sector.²³ The smart grid, as the Korean government envisions it, is to be the foundation for green growth.

While the definition of a smart grid varies, it is generally understood to mean the application of information technology to the grid, allowing for a digital, two-way flow of information between the consumer and the utility. It allows consumers to monitor in real-time how much power they are consuming and at what cost, which ideally leads to a

²¹ The 17 members are: Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, South Africa, the United Kingdom, and the United States.

²² Kim Tong-hyung, "Smart Grid Network Will Cost W28 Trillion," *Korea Times*, December 17, 2009.

²³ *Ibid.*

reduction in peak and overall demand. A smart grid can also accommodate energy from diverse fuel sources, including renewables such as wind or solar. Through an efficient balance between supply and demand, and the use of renewables as an energy source, smart grids can help decrease greenhouse gas emissions. Korea's version of a smart grid is centered on five concepts that will together lay the groundwork for green growth: the smart grid itself; "smart consumers," who will be able to adjust their energy usage based on information supplied by smart meters; "smart transportation," whereby electric vehicles will be re-charged through power stations connected to the grid; "smart renewables" that supply energy to the grid; and "smart electricity services," which provide important information to consumers, such as a real-time electricity bill.²⁴

The prototype for testing all of these ideas is now under construction on Jeju Island, which lies approximately 50 miles off of Korea's southwestern tip. When complete in 2013, 6,000 households in Gujwa-eup, the pilot community for the project, will be connected to smart grid technology. They will be the first to demonstrate how all Koreans might eventually use electricity under the central government's plan to install smart grid technology nationwide by 2030.

The Jeju project is an experiment, with high costs and uncertain outcomes. It has garnered the participation of 168 companies, investment commitments of 239.5 billion won (\$207.4 million), and planned government spending of 68.5 billion won (\$59.3 million).²⁵ However, it is an important first step, and the government plans to use the results in setting standards for domestic smart grid technology.

Korea's smart grid initiatives do not stop at the water's edge of Jeju Island. According to a recent report, KEPCO is vying for a 100 billion won (\$85.4 million) pilot project to test core technologies in a smart grid system in Australia.²⁶ And, in a bid to lead the world market for smart grid technology, KEPCO has won global recognition for some of its systems. For example, KEPCO's power line communication system (for transmitting data over conductors used in electricity transmission) was adopted last August by the International Organization for Standardization (ISO) as a global standard. In response, KEPCO said in a statement, "the adoption of our power line communication by the ISO paves the way for us to preempt the global smart grid market."²⁷

According to Guido Bartels, head of the U.S.-based Gridwise Alliance, an industry organization, South Korea has all of the right attributes to do exactly that. At a January 2010 smart grid summit in Seoul, he said that South Korea's strong position in information technology, automobiles and electricity production, combined with government and business leadership that is seriously committed to the smart grid, make the country well-positioned to take the lead globally.²⁸

²⁴ Presentation by In-Soo Park, Director of the Korean Agency for Technology and Standards, at the World Smart Grid Summit, Seoul, Korea, January 2010.

²⁵ Kim Tong-hyung, "Smart Grid Network Will Cost W28 Trillion," *Korea Times*, December 17, 2009.

²⁶ "KEPCO bids for smart grid pilot project in Australia," *Yonhap*, January 30, 2010.

²⁷ "KEPCO's power line communication adopted as global standard," *Yonhap*, August 1, 2009.

²⁸ "S. Korea well positioned to lead global smart grid market: energy executive," *Yonhap*, January 21, 2010.

Yet, the Technology Action Plan for smart grids co-written by Korea notes that defining globally-applicable performance standards for the smart grid is difficult in light of the diverse needs, conditions, and resources in each country. The report states:

“Implementing smart grids technologies does not allow a ‘one size fits all’ approach. Each smart grid encompasses a diverse spectrum of technologies, applications, and solutions that can vary by country, regional characteristics, and stakeholder drivers. While individual countries will face unique challenges in deploying smart grids technologies, common challenges can be overcome through global coordination and cooperation.”²⁹

By aiming to become the first country to apply smart grid technology to its entire grid, Korea is seeking a leadership role in responding to these common challenges.

Two Million Green Homes

In November 2009, Korean industrial giant Samsung Engineering and Construction unveiled “Green Tomorrow,” a model home powered entirely by renewable energy sources. Through measures designed to reduce energy loss (such as triplex windows, better insulation, and a highly efficient ventilation system) and use of renewable sources (mostly solar panels), Green Tomorrow is a net-zero-energy house, meaning that it produces as much energy as it consumes.³⁰ Green Tomorrow is the first-ever building in Korea to receive the highest possible grade, known as LEED Platinum, from the U.S. Green Building Council, a U.S. non-profit group whose LEED ratings (Leadership in Energy and Environmental Design) are used to grade green buildings worldwide.

The success of Green Tomorrow may bode well for the central government’s goal of building one million green homes and converting another million residences into green homes by 2020. (Consistent with its global PR push, Korea will break ground later this year on an eco-friendly cultural center in New York City).³¹ The Presidential Committee on Green Growth defines a green home as an “energy-saving environment-friendly home that obtains energy independently using new and renewable energy sources including photovoltaic, wind, hydrogen, and fuel cell. In addition, green home creates no carbon emissions and uses less energy, water and natural resources.”³²

In Korea, buildings are responsible for 24 percent of the nation’s total energy consumption.³³ With Green Tomorrow, Korea may be edging its way toward quelling

²⁹ “Technology Action Plan: Smart Grids,” Report to the Major Economies Forum on Energy and Climate Change, prepared by Italy and Korea, December 2009, <http://www.majoreconomiesforum.org/images/stories/documents/MEF%20Smart%20Grids%20TAP%201Dec2009.pdf>

³⁰ Cho Chung-un, “Samsung showcases ‘zero-energy’ house,” *The Korea Herald*, November 10, 2009.

³¹ “S. Korea to Build Eco-Friendly Culture House in New York,” *Asia Pulse*, January 8, 2010.

³² Presidential Committee on Green Growth website, www.greengrowth.go.kr.

³³ Doh Tae-ho, “Green Growth: Korea’s New Strategy, Korea set to build 2 million green homes,” *The Korea Herald*, March 30, 2009.

the energy appetite of homes and buildings. But replicating Green Tomorrow on a commercial scale is still fraught with obstacles—especially the cost. The cost of building Green Tomorrow was twice as much as the cost of building a conventional home. Samsung estimates that the construction costs of building a home like Green Tomorrow will be reduced to just 10 percent above that of conventional homes by 2013.³⁴ In any case, it will take the right mix of regulations and incentives for the central government to fulfill its aim of two million green homes by 2020. Korea has started to implement some measures. In 2008, the government launched a pilot program to assess the energy performance of new buildings. It is planning to implement tax incentives for contractors who have built or converted a specified number of green homes, and it is continuing the process of strengthening insulation standards.³⁵ Local governments are also launching programs of their own for green homes. The Seoul Metropolitan government announced plans in July 2009 to spend 45 trillion won (\$35 billion) by 2030 to re-make the city into one of the greenest in the world, including by increasing the energy efficiency of all buildings that measure 2,000 square meters and up.³⁶

However, compared to other advanced nations, Korea is starting from behind in pursuit of its ambitious target. For example, Korea adopted a Housing Performance Grading Indication System in 2006; by contrast, the U.S. Green Building Council was born in 1993 and the U.S. government's Energy Star rating program was launched in 1992. But, if Korea's ambitions for a new, green business district in Incheon are any indication of the country's determination, then it may not be far behind for long. The construction of the Songdo International Business District in Incheon represents a master-planned green city of unprecedented scale. Songdo's master plan, developed in collaboration with U.S.-based Gale International, will take into account the environmental impact of every aspect of the city, and upon completion in 2015, it is estimated that 65,000 people will live in Songdo and 300,000 will work there.³⁷ Songdo is part of the LEED-ND (Neighborhood Development) Pilot Program, through which the project will seek LEED certification for the entire city.

Electric Vehicles

Through a mix of tax incentives and subsidies, the Korean central government is attempting to secure a place for electric vehicles in Korea for consumers and auto manufacturers. The government is considering exempting electric cars from consumption, acquisition, and registration taxes to stimulate demand, a measure that could save consumers up to 3.5 million won (\$3,000) on the purchase of one vehicle.³⁸ In support of research and development into batteries and other systems needed for electric cars, the government announced last year it would spend 40 billion won (\$348

³⁴ Cho Chung-un, "Samsung showcases 'zero-energy' house," *The Korea Herald*, November 10, 2009.

³⁵ Cho Wook-hee, "Green Growth: Korea's New Strategy, Green growth offers opportunity for builders," *The Korea Herald*, May 7, 2009.

³⁶ Song Sang-ho, "Seoul city announces 'green' plan," *The Korea Herald*, July 3, 2009.

³⁷ Christine Todd Whitman, "Green Growth: Korea's New Strategy, Songdo sets new standards for green cities," *The Korea Herald*, March 17, 2009.

³⁸ Kim Hyun-cheol, "Tax Incentives Eyed for Electric Cars," *Korea Times*, February 19, 2010.

million).³⁹ Recent plans by the Ministry of Knowledge Economy indicate that domestic producers will roll out electric vehicles later this year and begin mass production in 2011, with the goal of garnering 10 percent of global market share by 2015.⁴⁰ However, there are some legal obstacles to overcome first: A *Global Insight* report noted that, “South Korea presently bans the use of cars that rely on electricity as their only power source, citing safety reasons such as a lack of transport standards and other administrative issues.”⁴¹ Legal revisions to remove these restrictions are in the works.

While Korean auto companies are working to develop plug-in and fuel cell electric vehicles, other companies are trying to gain a foothold in a crucial component of the vehicles: the batteries and charging infrastructure that will power them. KEPCO recently announced that it has developed two types of battery chargers for electric vehicles, a high-speed version that charges 80 percent of a battery in 20 minutes, and a slower version for use in charging a vehicle overnight, at home.⁴² Lithium-ion batteries, used in many portable electronics, are also being produced in Korea for use in electric vehicles. In a bid to develop and secure more lithium supplies, the government is teaming with steelmaker POSCO to invest a combined 30 billion won (\$26 million) in a plan to extract lithium from seawater.⁴³ Charging stations present another difficult and costly challenge. KEPCO and Hyundai-Kia Motor, which have teamed up to develop electric vehicles, are also cooperating on charging stations, including standardizing a charging interface.⁴⁴

“Think Green, Triple Sales”: The Korean Private Sector

In Copenhagen last December for international climate treaty negotiations, Chung Rae-Kwon, Korea’s climate change ambassador and a founder of the green growth movement, lamented what he viewed as the gathering’s myopic focus on emissions cuts and timetables, asserting in an interview with the *Los Angeles Times* that the conference was missing a key point: the money to be made in responding to climate change. He said, “What we’re negotiating here is the real substance of the real economy. We are talking about billions of dollars in real numbers.”⁴⁵ Indeed, the HSBC Climate Change Benchmark Index, which tracks the stock market performance of 377 companies best positioned to profit from responding to climate change, outperformed global equities by 46 percent between 2004 and 2009.⁴⁶ While some Korean firms have voiced concern about green growth policies they say will result in costly adjustments, several of Korea’s

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Paul Newton, “South Korean Government to Offer Sales Incentives Ahead of EV Launch in Domestic Market,” *Global Insight*, February 18, 2010.

⁴² Cho Chung-un, “KEPCO develops electric vehicle battery charger,” *The Korea Herald*, January 6, 2010.

⁴³ “Korean Govt, POSCO to Invest in Lithium-Extracting Plant,” *Asia Pulse*, February 2, 2010.

⁴⁴ Cho Chung-un, “KEPCO builds greener, smarter future,” *The Korea Herald*, November 9, 2009.

⁴⁵ Jim Tankersley, “Pushing green growth at summit; South Korean envoy says nations that invest in energy efficiency can reap profits while reducing emissions,” *Los Angeles Times*, December 9, 2009.

⁴⁶ As reported in “Korea Aims to Become Green Economic Power,” by Na Jeong-ju, *Korea Times*, December 2, 2009.

top firms are getting on board, likely motivated in part by the anticipation of a Renewable Portfolio Standard that would require Korean utilities to generate 10 percent of their electricity from renewable sources by 2020.⁴⁷

A snapshot of recent announcements from Korean firms indicates that KEPCO's new slogan—"Think Green, Triple Sales"⁴⁸—may be an apt description for the current mindset of some leading companies. KEPCO, which has set a goal to triple sales by 2020 through green growth, has said it will invest 2.5 trillion won (\$2.1 billion) in seven key technologies, including carbon capture and storage (CCS), the smart grid, and electric car charging infrastructure.⁴⁹

In a bid to prop up business amid a worldwide decline in ship orders, major shipbuilders in Korea are making the switch to wind turbines—technology they are well suited for after decades of building ship propellers. The world's largest shipbuilder, Hyundai Heavy Industries, is expanding into wind turbines and is beginning to make inroads in the United States. Last fall, a Wisconsin wind energy firm, Wave Wind LLC, provided Hyundai an important entrée to the United States wind power industry when it chose Hyundai as its supplier for six wind turbines.⁵⁰ It may be a signal of future collaboration, as both companies recognize their mutual interests. Wave Wind hosted a business development tour for Hyundai in Wisconsin last November, and has submitted bids for the construction and maintenance portions of 15 future projects Hyundai is planning in the United States. Wave Wind's business development coordinator, Dionne Lummus, told the *Wisconsin State Journal*, "They [Hyundai Heavy Industries] really needed a strategic partner here in the U.S., and we've opened doors for them. The idea is that we'll make the introductions, they'll sell their turbines, we get the maintenance and construction part, and everybody wins."⁵¹

Samsung Heavy Industries is making similar moves. In May 2009, the company reached an agreement with Texas-based Cielo Wind Power to supply the company with three 2.5 megawatt wind turbines.⁵² The first one arrived in November. Signifying a different strategy, last August, Daewoo Shipbuilding & Marine Engineering, the world's second largest shipbuilder, acquired DeWind, a U.S. producer of wind turbines.⁵³ Other Korean shipbuilders, such as STX, and Doosan, are also entering the wind turbine construction business, though they are far behind companies with strong footholds in the market, such as Vestas of Denmark.

⁴⁷ Cho Chung-un, "KEPCO builds greener, smarter future," *The Korea Herald*, November 9, 2009.

⁴⁸ Lee Kyung-Min, "KEPCO Aims to Enter Global Top Five Rankings with Green Energy," *Korea IT Times*, July 8, 2009, <http://www.koreaitimes.com/story/4052/kepc0-aims-enter-global-top-five-rankings-green-energy>

⁴⁹ Ibid.

⁵⁰ Karen Rivedal, "Local business, S. Korean firm to work on wind farm," *Wisconsin State Journal*, December 16, 2009.

⁵¹ Ibid.

⁵² "Samsung Wind Turbines in Texas," press release, Cielo Wind Power, May 8, 2009, <http://www.cielowind.com/news/press-releases/samsung-wind-turbines-in-texas>

⁵³ Kim Hyun-cheol, "Wind Power New Growth Engine for Shipbuilders," *Korea Times*, November 30, 2009.

Doosan, Samsung and Hyundai have all announced plans to spend hefty sums in pursuit of renewable energy products. Doosan Heavy Industries and Construction has said it will invest 700 billion won (\$602.8 million) by 2013—on top of the 300 billion won (\$258.3 million) it has already spent—to develop power generation technology that emits zero carbon.⁵⁴ Samsung Electronics has announced planned investments of 5.4 trillion won (\$431 billion) by 2012 to reduce greenhouse gas emissions through alternative energy and R&D on environmentally friendly products.⁵⁵ LG Chem, the country's leading chemical producer, will supply lithium-ion batteries for General Motors' Chevrolet Volt, while LG Display, maker of liquid-crystal display panels, says it plans to spend 50 billion won (\$43 million) to develop solar cells.⁵⁶

The U.S. Approach

America's thinking on climate change has shifted in the last decade. While there still exists a range of opinions on the priority this challenge should have in public policy, and what to do about it, the quest for renewable energy has caught on, and climate change is now a household term. Actors across the spectrum—from the White House, to state governments, to the grassroots—are advocating for, and in some cases, implementing, policies to reduce emissions and advance technology.

For the purposes of this paper—exploring the potential for U.S.-ROK cooperation on climate change mitigation and renewable energy—three points are important. First is the emergence of a business movement that supports climate change legislation in the United States Congress. One manifestation of this is the [U.S. Climate Action Partnership](#) (USCAP), a group of companies and environmental groups pushing for climate and energy legislation that is “environmentally effective and economically sustainable.”⁵⁷ USCAP's philosophical underpinning is that “climate change will create more opportunities than risk for the U.S. economy,” an idea the group believes should help to shape the legislation.⁵⁸ The prospect of emissions regulation by the Environmental Protection Agency is another impetus for USCAP to rally around the idea of Congressional legislation—a process much more open to influence by outside groups. Speaking on behalf of USCAP in a recent interview with the PBS Newshour, Dow Chemical vice president Peter Molinaro said, “If we don't do anything, we will have regulatory oversight from the EPA regulating greenhouse gases under the Clean Air Act. That could be more damaging to the economy than if we do this in a market-based system.”⁵⁹

⁵⁴ Song Jung-a, “Doosan focuses energy on renewables,” *Financial Times*, November 16, 2009.

⁵⁵ Song Jung-a, “Samsung to spend \$4bn on eco-tech,” *Financial Times*, July 21, 2009.

⁵⁶ Ibid.

⁵⁷ USCAP website, <http://www.us-cap.org>

⁵⁸ “A Call for Action,” USCAP report, <http://us-cap.org/USCAPCallForAction.pdf>

⁵⁹ Peter Molinaro interview with Judy Woodruff, PBS Newshour, January 26, 2010, <http://www.pbs.org/newshour/rundown/2010/01/business-environmental-colation-pushing-for-climate-change-regulation.html>

At 28 members, USCAP hardly represents American business at large, but it counts among its members 10 Fortune 100 companies, and is an important voice in the debate as well as a point of analysis for how industry might influence any legislation that ultimately becomes law. Last June's passage of a climate bill in the House of Representatives marked a high point for USCAP, as the legislation included many ideas the group has championed. Greenwire reported that the bill's main architects, Democratic Reps. Henry Waxman of California and Ed Markey of Massachusetts, "gave orders to their staff to follow U.S. CAP's blueprint as they wrote the legislation, and they often cited the coalition's positions back to nervous members as they built a narrow House majority."⁶⁰ However, with the Senate appearing unlikely to take action, prospects for final legislation this year are dim, and the February 2010 withdrawal of three high-profile member companies from USCAP generated a flurry of reporting about potential rifts among the group's members. BP America, Conoco Phillips, and Caterpillar announced that they would not renew membership in USCAP, saying they felt the proposed legislation unfairly disadvantaged their firms. Still, the specter of EPA regulation could be one factor that will keep the coalition focused. Reflecting on the departures at USCAP, the co-founder of the U.S. Climate Task Force, Robert Shapiro, said in an interview, "the prospect of Congress and this president preempting EPA regulation without an alternative program in place is virtually zero. Consequently, one has to think that what they're looking for is not no action on climate, because something is definitely going to happen, but Plan B."⁶¹

Second, initiatives on climate change mitigation and clean energy come from many different sectors and levels in the United States, presenting a challenge and an opportunity for Korean organizations looking for U.S. partners. While the mismatch between Korea's top-down approach to green growth and U.S. efforts that spring up at all levels can make it more difficult for Korean firms to identify potential partners, it also offers a variety of possibilities that can be seized upon more quickly. In some cases, states are taking matters into their own hands, such as the 10 that joined together to form the Regional Greenhouse Gas Initiative (RGGI) in the northeastern United States, a regional emissions trading scheme. Other important initiatives, such as the U.S. Green Building Council's LEED standards, have come from outside government. In other cases, cities have been creative in designing environmental solutions that fit their local circumstances, such as the rebuilding of Greensburg, Kansas discussed below.

Finally, the decentralization of federal research and development, and the U.S. science budget as a whole, can make it difficult to pinpoint possible avenues of cooperation. Dozens of Congressional committees and subcommittees exercise jurisdiction over pieces of the science budget. Most of the Department of Energy's 21 national laboratories and technology centers are directly or indirectly involved in some aspect of energy research or clean energy technology development. DOE also directs funding to universities, the private sector, and non-profit organizations for energy-related research. For example, the DOE recently announced competitive awards open to universities, non-profit

⁶⁰ Darren Samuelsohn, "Soul-searching follows U.S. CAP defections," Greenwire, February 22, 2010.

⁶¹ Interview with Robert Shapiro, E&ETV's OnPoint, February 22, 2010, Vol. 10 No. 9.

organizations, private firms, or national laboratories for operation of three new “energy innovation hubs.”⁶²

U.S.-ROK Cooperation On Climate And Energy

New energy technology interests in the United States and Korea have found each other, in places like Golden, Colorado; Springfield, Illinois; Madison, Wisconsin; and Jeju Island. Following is a sampling of cooperative arrangements between the United States and Korea, many of which have occurred within the past year.

Private Sector

Smart Grid

In June of 2009, the Korea Smart Grid Association signed an agreement with the U.S. Gridwise Alliance, an industry group chaired by IBM, to share best practices as both countries seek to modernize their electrical grids.⁶³

Last October, General Electric signed an agreement to work with Korea’s NURI Telecom to build smart grid technology in Korea.⁶⁴ Both companies are members of the U-SNAP Alliance, an industry group that is creating an industry standard for the information technology that links Home Area Networks to smart meters, allowing consumer appliances to communicate with smart meters.⁶⁵

Electric Vehicles

Korea’s LG Chem has received cash grants from the U.S. federal government and tax breaks from the state of Michigan to build a plant that will produce lithium-ion batteries for electric vehicles in the United States. LG Chem will supply lithium-ion batteries for General Motors’ Chevrolet Volt plug-in vehicle.⁶⁶

A joint venture between Dow Chemical and South Korea’s TK Advanced Battery will build a facility in Midland, Michigan for manufacturing lithium-polymer batteries, used in electric vehicles.⁶⁷ The plant is expected to employ more than 300 people and run for at least 15 years.

Green Buildings

⁶² Department of Energy website, <http://www.energy.gov/hubs/index.htm>

⁶³ “U.S. and Korea Smart Grid Organizations Sign Historic Agreement,” Gridwise Alliance press release, June 15, 2009.

http://www.gridwise.org/uploads/pr/NEWS%20RELEASE6_15Final.doc

⁶⁴ “GE Enters Agreement to Help Bring Smart Grid Technologies to Korea,” *Resource Week*, October 11, 2009.

⁶⁵ U-SNAP is an acronym for Utility Smart Network Access Port. See www.usnap.org

⁶⁶ Jin Hyun-joo, “LG Chem taps into U.S. electric car battery market,” November 19, 2009.

⁶⁷ Jaelyn Trop, “Dow Chemical, S. Korean partner to invest \$294 million in Michigan battery plant,” *The Detroit News*, February 25, 2010.

U.S.-based Gale International, a private real estate development and investment firm, and Korea's POSCO Engineering & Construction Ltd. are developing Songdo City as a leading "green city." The joint venture is participating in the U.S. Green Building Council's LEED Neighborhood Development Pilot Program to certify the entire city as being sustainably developed.⁶⁸

Renewable Energy

As discussed above, Hyundai Heavy Industries and Samsung Heavy Industries inked agreements in the fall of 2009 to supply wind turbines to wind energy firms in Wisconsin and Texas. Daewoo Shipbuilding and Marine Engineering acquired U.S.-based turbine producer, Dewind.

Carbon Markets

In June 2009, the Chicago Climate Exchange (CCX) agreed to advise Korea on establishing a carbon exchange market, including advice on how to calculate greenhouse gases emitted by companies participating in the exchange. CCX signed a Memorandum of Understanding with Korea Power Exchange, Korea Energy Management Corporation, and Korea Exchange.⁶⁹

Government-to-Government

Smart Grid

On January 20, 2010, the Ministry of Knowledge Economy and the Illinois Department of Commerce signed a MOU to build a business model for a smart grid on Jeju Island in Korea, and adapt lessons learned from that experience to construct smart grids in Seoul and Chicago.⁷⁰

Vehicles

Chevron and Hyundai-Kia teamed up in 2004 under a U.S. Department of Energy program on a five-year demonstration project to develop and test fuel cell electric vehicles and hydrogen fueling stations. United Technologies provided the fuel cells.⁷¹

Renewable Energy

The U.S. Commercial Service assisted U.S. companies with showcasing their solar energy-related technologies at Korea's "Expo Solar 2010" and "Solarcon Korea 2010" in February.⁷²

⁶⁸ Christine Todd Whitman, "Green Growth: Korea's New Strategy, Songdo sets new standards," *Korea Herald*, March 17, 2009.

⁶⁹ "South Korea, USA, sign cooperation agreement to reduce greenhouse gas emissions," *Yonhap*, June 16, 2009.

⁷⁰ "Korea-Illinois Conclude MOU on Smart Grid," States News Service, January 26, 2010.

⁷¹ K. Wipke, C. Welch, S. Gronich, J. Garbak, and D. Hooker, "Introduction to the U.S. Department of Energy's Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project," Conference Paper NREL/CP 560-39979, May 2006.

⁷² See <http://www.buyusa.gov/korea/en/>

The U.S. National Renewable Energy Laboratory is working with the Korean Institute of Science and Technology on solar cell research.⁷³

Looking Ahead: Potential U.S.-ROK Cooperation

Korea's public commitment to green growth may be one of its greatest assets in attracting a new wave of partnerships and investments from governments and businesses. As witnessed in the United States, where business groups like USCAP are urging Congress to pass climate legislation, policy certainty is critical for investors. They need to know that goals, policies, and the rules of the game are firmly in place before directing their funds into a particular country or project. David Sandalow, Assistant Secretary for Policy and International Affairs at the Energy Department, underscored this point in recent remarks at the Center for Strategic and International Studies in Washington, where he said, "One of the things I often hear are businesses bemoaning lack of stability in regulatory systems, and businesses...have often made the point that once the rules are set, they can plan accordingly."⁷⁴ Indeed, in a recent survey of 200 institutional investors by the investment bank Jefferies, investors said that national support for clean-tech industries is more important than an international climate treaty.⁷⁵ When Korea's Basic Law on Low Carbon and Green Growth takes effect this spring, Korea will have taken an important step toward creating the certainty that investors are seeking. In addition, the central government has formed a joint committee with business associations to improve communication with the business community on future policies related to green growth.⁷⁶ This may be an important avenue of communication for the U.S. business community to tap into. Following are potential areas for further US-ROK collaboration.

Technological Standards

Technological standards could be an important area of exploration for future U.S.-ROK cooperation on clean energy technologies. Standards provide "a common technical language" for customers and suppliers by serving as an agreed-upon reference for the specifications and criteria to be applied consistently to manufacturing and business processes.⁷⁷ They are critical because the companies that establish the most widely-recognized standards are the ones that will have a head start in supplying important clean energy components most widely. The International Organization for Standardization (ISO), comprising the national standards institutes of 158 member countries, is the largest developer of standards in the world. The National Institute of Standards and Technology (NIST), the

⁷³ National Renewable Energy Laboratory, http://www.nrel.gov/international/bilateral_partnerships.html

⁷⁴ David Sandalow, remarks at the Center for Strategic and International Studies, Washington DC, February 17, 2010.

⁷⁵ "Jefferies 2009 Cleantech Investor Survey Finds That Continued Government Subsidies Are More Crucial Than Achieving Consensus in Copenhagen." press release, December 21, 2009, <http://www.jefferies.com/cositemgr.pl/html/OurFirm/NewsRoom/PressReleases/2009/200912211press.shtml>

⁷⁶ Na Jeong-ju, "Korea Aims to Become Green Economic Power," *Korea Times*, December 2, 2009.

⁷⁷ International Organization for Standardization website, http://www.iso.org/iso/support/faqs/faqs_general_information_on_iso.htm

U.S. government's standards organization housed within the Department of Commerce, has the primary responsibility for coordinating the development of standards and protocols for U.S. smart grid devices and systems. NIST, along with the American National Standards Institute (ANSI), a non-profit organization that represents the United States at the ISO, might provide a potential pathway to partnership between the United States and Korea. In addition, industry organizations that help set standards, such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers or the National Association of Homebuilders, could merit exploration regarding collaboration.

Wind Energy

As noted above, Korean shipbuilders turning to wind turbine construction are starting to enter the American market. The American Wind Energy Association may provide a forum for exploring ways to deepen collaboration in this industry.

Carbon Capture and Storage (CCS)

Australia's Global Carbon Capture and Storage Institute warned in a November 2009 report that CCS projects need much more support if the G-8 is to meet its goal of 20 operational CCS projects by 2020.⁷⁸ Korea's KEPCO is trying to commercialize CCS technology it has developed, while the United States' FutureGen project, intended to be the world's first near-zero emissions coal-fueled power plant, has been beset by funding delays for controversial reasons, though it now appears to be getting back on track. The U.S. Department of Energy announced in December that it will award a total of \$1 billion to three CCS projects in the United States.⁷⁹ In addition, in February 2010, President Obama established an Interagency Task Force on Carbon Capture and Storage, whose mandate includes considering ways to build international collaboration on CCS.

Green Buildings

Korea's commitment to building or renovating two million green homes may present an opportunity for U.S.-ROK collaboration on cost-effective building materials and other components needed to make the "Green Tomorrow" home a reality for millions of Koreans.

Smart Grid

While there are U.S.-ROK agreements in place to collaborate on smart grid technology, it is clear that many American utilities are interested in pursuing smart grids, and that many technological challenges remain to be solved. These factors might provide an opening for more U.S.-ROK cooperation. In a 2010 survey of more than 50 North American utilities, 70 percent of respondents said smart grid initiatives ranked as "either a strong priority or the highest priority

⁷⁸ John Phaceas, "Business can't do carbon capture alone," *Western Australia Business News*, November 5, 2009.

⁷⁹ "Government Provides Carbon Capture Project Funding," *Clean Skies News*, December 7, 2009.
<http://www.cleanskies.com/articles/government-provides-carbon-capture-project-funding>

relative to their overall business plans between now and 2015.”⁸⁰ Integrating electric vehicles into the smart grid ranked as one of the top three concerns about smart grid deployment (systems integration and data management solutions were the other two).⁸¹ California, where Pacific Gas and Electric will soon roll out a smart charging station pilot project, is likely to be at the forefront of U.S. efforts to deploy electric vehicles and test charging station technology.⁸² When Nissan introduces its electric vehicle, the Leaf, later this year, the majority of its first round of cars will be delivered to California.⁸³ General Motors is also expected to introduce the Chevrolet Volt at the end of 2010.⁸⁴ According to Rick Thompson, president and co-founder of Greentech Media, whose research arm undertook the smart grid survey, “The year 2010 is pivotal for the evolution of smarter grids, as it marks the time when the market will begin its transition from hype to reality. The future success and ultimate size of the opportunity in terms of market growth will be largely dependent on the events that unfold within the next 12-24 months.”⁸⁵ The U.S.-based Electrification Coalition, a non-profit group of business leaders that promotes electric vehicles, could be a potential partner for Korea to explore ways to collaborate on the challenges of deploying electric vehicles on a wide scale and their integration into the smart grid.

Sister City Programs

Sister city programs can provide the impetus for educational exchanges that lead to more cooperation. Greensburg, Kansas, a small town leveled by a tornado in 2007, is rebuilding itself as a green community, with support from DOE’s National Renewable Energy Laboratory. The use of light-emitting diodes in a new streetlight system and energy-efficient materials in new buildings are just two examples of the many ways that residents and business owners are rebuilding with energy efficiency and clean energy technologies in mind.⁸⁶ In St. Charles, Maryland, real estate developer American Community Properties plans to re-develop the mixed-use planned community into a green one. Plans call for improved insulation and windows, and energy-efficient appliances in buildings, plus smart meters to be tested in 1,000 homes.⁸⁷ Another developer, Competitive Power Ventures, plans to build a 10-megawatt solar power plant in the city.⁸⁸

⁸⁰ “The 2010 North American Utility Smart Grid Deployment Survey,” GTM Update, Greentech Media, February 10, 2010, www.greentechmedia.com

⁸¹ Ibid.

⁸² Todd Woody and Clifford Kraus, “Cities Prepare for Life With the Electric Car,” *New York Times*, February 14, 2010.

⁸³ David J. Leeds, “The Networked EV: Smart Grids and Electric Vehicles; First Stop, California,” GreenTechMedia, February 23, 2010, www.greentechmedia.com

⁸⁴ Ibid.

⁸⁵ “The 2010 North American Utility Smart Grid Deployment Survey,” GTM Update, Greentech Media, February 10, 2010, www.greentechmedia.com

⁸⁶ Lynn Billman, “Rebuilding Greensburg, Kansas as a Model Green Community: A Case Study,” Technical Report NREL/TP, November 2009, <http://www1.eere.energy.gov/buildings/greensburg/pdfs/45135-1.pdf>

⁸⁷ Lisa Rein, “Remaking St. Charles in a shade of green,” *Washington Post*, November 30, 2009.

⁸⁸ Ibid.

Greensburg and St. Charles could be good candidates for green sister city relationships with Korean cities.

Conclusion

To be sure, the United States and Korea do not face identical challenges when it comes to climate change mitigation or deploying new energy technologies. Differences in the composition of each country's economy, as well as in geography, society, and population density will demand different solutions. As noted above, the U.S. mixture of climate change approaches from all layers of government and society stand in contrast to Korea's largely top-down approach to climate policies. While this may present a challenge to identifying the right partners, the sheer volume of U.S. activities to choose from is also an opportunity for Korea. If the Korean central government's green growth PR blitz since August of 2008 indicates the trajectory of Korea's commitment to green growth, and if the burgeoning trend of U.S. initiatives continues, then there is potential for the US-ROK alliance to catalyze green growth, with clear benefits for both sides.

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