carbon in immense amounts. Excess carbon in the atmosphere is not good, but carbon is one of the essential gases that make life on earth possible. Forests both store and release significant amounts of carbon as part of a natural cycle. The forest ecosystem as a biomass plays an important role in carbon sequestration. To sustainably maintain these two functions of forest resources, the actions such as the reduction of emissions from deforestation and forest degradation, the conservation of forest carbon stocks, sustainable management of forests and the enhancement of forest carbon stocks are essential.

LEE Seong Eun Former President Lee Myung-bak announced "Low Carbon Green Growth" in August 2008, as a national vision for the next 60 years. Aiming to become one of the five greenest countries in the world by 2050, South Korea mapped out a five-year plan for a national strategy of green growth. In line with the government policy, the Jeju Special Self-Governing Province set in motion the first phase of a five-year plan for low carbon, green growth in 2009. Based on the assessment and analysis of the results of the first five-year plan(2009-2013), the province launched the second five-year plan(2014-2018) with the goal of achieving "World Environmental Capital." For the Forest Recreation Project for 2016, the province invested 94.3 billion won in forest recreation, forest management and conservation, and the Halla Eco-Forest in order to prevent pine wilt disease, cultivate resources for forest recovery and support forestation activities to create a natural environment with refreshing and healing effects on the island.

The forest land per capita in Jeju Island occupies 1,484㎡ as of 2015, the second largest in the nation, following Gangwon Province marking 2,405 ㎡. However, the forest areas around cities that are easy to access without the burden of travel and cost average at 9.91㎡ per capita across the nation, a size far smaller than the world standard. Jeju Province is set to invest three billion won to create 15 hectare of forests in nine urban areas on the island in 2017. This urban forestation movement is underway in metropolitan areas, with business enterprises, civic groups and residents actively participating in it.

[Q & A]

Q. KANG Ho-sang(Chairman, National Instrumentation Center for Environmental Management, Seoul National University) Is there a possibility or a concrete plan to cooperate with North Korea on forestation affairs, including the REDD+ project?

A. JEON Eui Chan Because of the lack of mutual trust between the two Koreas, it is difficult to push for an inter-Korean cooperation project on the initiative of the government. It would be better for religious groups such as the Committee for the Reconciliation of the Korean People at Catholic Bishops' Conference of Korea; civic groups like Forest for Life; and business enterprises with the experience of inter-Korean projects such as Yuhan Kimberley to promote the cooperation project under the administrative support of the government. They can also push for a transparent North aid program such as vermin extermination and fine dust reduction projects in North Korea. The government can secure part of the 11.3 percent of the emission reduction units that have been bought abroad to serve the needs of credit acquisition and afforestation in the North.

Policy Implications

- A close partnership between government agencies, non-governmental organizations and local residents is the best way to achieve sustainable development and green growth of Asia.
- To reach its emission reduction target under the new climate regime, South Korea should push for diverse the REDD+ projects jointly with Asian countries. It requires forestation projects with these countries to increase the use of renewable energy such as biomass.
- The REDD+ and afforestation projects should be pursued by both Asian countries and North Korea when it is permitted. The projects would help the entire Asian region maintain sustainable development and properly respond to climate change.

Supergrid and New Green Opportunities in East Asia

JEJU PEACE INSTITUTE 제주평화연구원 · 우리들의미래 Coalition for Our Common Future

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CHO Hwan-Eik This is an overview of what South Korea has done to build a Northeast Asia supergrid so far. The proposed Northeast Asia supergrid is aimed at developing and sharing renewable energy as well as enhancing power system reliability. Unfortunately, renewable energy is distributed unevenly and concentrated in certain areas, and areas with rich renewable energy sources are not necessarily areas with the demand. The role of the Northeast Asia supergrid is to build a "Smart Energy Belt" in ways that make renewable energy sources storable, transportable and controllable by smart grids. The project has developed to such an extent that a Memorandum of Understanding on joint promotion of an interconnected electric power grid, spanning Northeast Asia, was signed in March last year, and a pilot project was initiated for the first time between Mongolia, China, Korea and Japan.

Jeju has the clean air, however such routine happiness from clean air will become less available. Fine dust is causing a serious problem in our neighbor, China. The energy companies should draw a new picture of power generation in line with the government's policy to address the issue of resolving fine dust. The time has come for us to come up with ways to replace coal-fired power fundamentally, and hopefully together with fossil fuels.

Frank RIJSBERMAN Like all technologies across a rapidly competitive landscape, the speed of deployment and its cost are critical and major factors. The Asia supergrid was conceptualized to speed up the deployment of clean, safe and affordable renewable energy. The Asia supergrid attempts to pave the way for maximizing the use of renewable energy by taking advantage of diversity in loads and resources as well as increasing global access to reliable and sustainable energy for all by 2050. Plenty of renewable energy generation has been secured and is under development. Now the question is how to move the renewable energy throughout Asia. Asia represents about two-thirds of the total world population. Electricity generation by Japan, China, Korea and Russia represents 76 percent of Asia's total, and similarly, electricity consumption by these four countries represents 77 percent of Asia's total.

Simply put, Japan, China, Korea, and Russia

together represent a vast majority of electricity generation and consumption in the most populated regions in the world. This can be interpreted as, if joining grids together in Northeast Asia is possible, then there is a possibility of joining grids together worldwide to solve global energy issues. The falling costs are paving the way to pervasive low cost local renewable energy, which some critics say makes a supergrid largely limited in its potential. But the idea of a supergrid is appealing because one can invest more highly in areas with the greatest and cheapest renewable energy potential without worrying about how to use it.

Although battery storage prices are dropping, the scope of energy bulk and transmission between current storage technologies and the conceptual supergrid is a different magnitude. The heaviest bulk energy storage systems, composed of pumped hydropower and compressed air mechanisms, and even hydrogen fuel cell technology are meant to handle loads approaching one gigawatt, whereas the supergrid concept means to sustain transmissions of up to ten gigawatts to distant high-demand areas. For some locales that lack clean energy resources, or with those that have a strong traditional transmission infrastructure, such as areas of predominant coal use, ultra-high voltage lines provide a good bridge technology, providing cheaper clean-sourced electricity to meet demand, while incentivizing transition to a cleaner local energy mix. It is apparent as part of the discussion that a supergrid will offer countries like Korea and Japan cheaper and abundant clean energy from China and central Asia(Mongolia) as the international scope of the grid would enable transmission over, though cross-border, shorter distances. China has already laid down 75.5 billion dollars in new transmission lines as of 2015 to disburse these concentration resources, but a supergrid would enable the release of an immense amount of cheap clean energy within a vast region. Yet the medium and longer-term benefits of a regional supergrid will provide the backbone that accelerates a clean energy revolution.

In light of both its vast potential and possible shortfalls, the Global Green Growth Institute(GGGI)'s current support for the green growth cooperation among China, Korea and Japan focuses on systems and platforms that leverage and hope to accelerate the deployment of the supergrid. Our focus on linking Emissions Trading Systems(ETS) and finding green growth collaboration areas between these three countries relates strongly to the supergrid potential as an accelerating instrument. Green growth cooperation in Northeast Asia needs to center around keeping and accelerating the momentum of green growth domestically in light of the rapid changes in China and new opportunities through the One Belt, One Road initiative, while building on Japan's commitments and technology. There are new opportunities, and the private sector is strong in Korea.

Robert STAVINS What are some of the possibilities for climate change policy linkage among China, Japan and Korea? A key challenge for the eventual success of the Paris Climate Accord is whether the agreement, with its Nationally Determined Contributions(NDCs) anchored in domestic political realities, can adequately address emissions with sufficient ambition? Are there ways to enable and facilitate increased ambition over time? One of the answers could be linking regional, national, and sub-national policies and connections among policy systems that allow emission reduction efforts to be redistributed across systems. Linkage is typically framed as between cap-and-trade systems, but regional, national, and sub-national policies are highly heterogeneous. Among the potential merits of linkage are the ability to achieve cost savings and improve the functioning of individual markets by reducing market power, reducing total price volatility and allowing for the United Nations Framework Convention on Climate Change(UNFCCC)'s principals of common but differentiated responsibilities. On the other hand, concerns include: distributional impacts within jurisdictions; automatic propagation of some design elements; and reduction of national autonomy.

The greatest challenge to linkage under the Paris Agreement is that the NDCs exhibit three types of heterogeneity. First, there are heterogeneous instruments, which include cap-and-trade systems, emission reduction credits, taxes, performance standards, and technology standards. Second, there are heterogeneous jurisdictions, including regional, national, and sub-national policies. Finally, there are heterogeneous NDCs targets that would include hard emissions caps, relative mass-based emissions caps such as relative to business-as-usual, rates based emissions caps, such as per unit of economic activity or per unit of output, and non-emissions caps such as penetration of renewable energy sources. Looking at one of the simplest examples of such multi-dimensional heterogeneity, we can think about linking two cap-and-trade systems, which are both at the national level, and both have NDCs in the form of mass-based caps. Even in such a case, linkage is fairly straightforward, but specific design elements can raise concerns, if not impediments to feasibility.

These include elements of design heterogeneity and differences in allowance prices, scope of sectoral coverage, regulations, nature of the caps, allocation, monitoring and reporting, enforcement provisions, cost-containment provisions. In current research, I am examining three key questions regarding the numerous combinations of various types of heterogeneous linkage. First, which links are feasible among the set of instrument-jurisdiction-target combinations? Second, are some types of feasible links not desirable? Third, what accounting treatments and tracking mechanisms are necessary for various types of links? The results of this research will be presented at the next UNFCCC Conference of the Parties, in Bonn in November 2017.

What needed to be in the Paris Accord to facilitate linkage? And the first principle should be do no harm if it is poorly designed. The 2016 agreement could have inhibited effective linkage. Then what the Paris Accord needed to include is a statement that countries can achieve parts of their intended NDC targets by financing or otherwise facilitating actions in other jurisdictions.

Keywords
Supergrid, Smart grid, Asia, New and renewable energy, Fine dust, Battery storage, Green growth, Policy linkage, Paris Agreement

Policy Implications

- Renewable energy matters much because it is distributed.
- A pilot project has recently been initiated for the first time between Mongolia, China, Korea and Japan to jointly develop the Northeast Asian Supergrid.
- It's about time that energy companies drew a new picture of power generation in line with the government's policy towards green growth.
- Regional cooperation for green growth should center around keeping and accelerating the momentum of green growth domestically in light of the rapid change in China and new opportunities through the One Belt, One Road initiative while building on Japan's commitments and technology.

SUSTAINABILITY