

the central government is called for, and we should be reminded that a bottom-up approach has proven most effective on environmental issues.

— **PARK Kwangwoo** Restoring the only maar-type crater in the Korean Peninsula is a singular undertaking, since it paves the way to obtaining cumulative data on paleontology and paleoclimatology from the sedimentary strata of some forty- or sixty-thousand years ago. By coupling the data with climate information collected from maar-type craters in China and Japan, we can estimate the past climate of East Asia with more precision. The joint historical climate data processing among the three countries could, in turn, improve the accuracy of future climate change forecast, contributing to the prevention of and response to natural disasters. A proposed restoration of Hanon crater and a relevant research center would mean that South Korea could operate the only research base with historically traceable data regarding paleoclimatology, paleontology and the impact of atmospheric movement in the past.

It is imperative to restore the invaluable resource, which has been damaged to the point of destruction largely due to rapid industrialization since the 1970s and the development of neighboring areas since the 2000s. Global experts have recognized the need to stop further damage and conserve the site, passing the proposal for restoring Hanon crater at 2012 Jeju WCC. Construction inside the crater has seriously damaged paleontological areas by mixing up layers of chronological information in the deposit into an irretrievable mess. We need to come up with the details on effect the restoration that is expected to have on sectors of national long-term development. The geological strata analysis can compile important data on the trend of long-term ecological change on the Korean Peninsula and will also help develop a high-precision forecast technology, once it is coupled with the long-term analysis of the ecosystem of Mount Halla.

— **LEE Sukchang** The Seogwipo local government scrapped its plan for an off-season baseball training field at Hanon crater in 2002, after causing an uproar from civic and environmental organizations. Fifteen

years since, a bid for restoration gained traction once again with the WCC in 2012. It was mostly thanks to serious interest and support from expert groups and citizens who drew global attention to its value and the restoration project that Hanon crater managed to avoid random development. The restoration of the crater is the first of its kind in the world, meaning South Korea is poised to set the global standard for maar-type crater restoration. Once recognized as the leader in natural restoration technology and capability to blaze a new trail in the environment and tourism sectors, South Korea will naturally be able to raise its international standing. I suggest establishing a task force to draw up a strategy to implement the presidential campaign pledge, enlisting lawmakers, the local government, committee members, experts as well as the local population. A systematic activity of the new task force will make the restoration project a signature environmental policy of the new government.

● ● ● Policy Implications

- There are several challenges for the new government to put the planned restoration of Hanon crater on the national policy agenda: First, it should clearly present the value of the crater and logically justify the restoration project so that the project may be conducted with a clear sense of obligation to restore the natural environment; second, a task force joined by relevant agencies, civic groups, experts and representatives of the local population should be formed immediately to draw up an execution strategy for the campaign pledge; third, a close cooperative network among government agencies(both central and local), relevant organization, International Union for Conservation of Nature(IUCN), etc. should be established; lastly, the Jeju local government should take the initiative in forming a consensus among the landlords, local residents and the general public and a shared understanding of the rationale for the restoration project.

How to Improve Eco-efficiency for Achieving Carbon-free Society



Chair	JEONG Dai Yeun Director, Asia Climate Change Education Center of Jeju Special Self-Governing Province
Keynote Speaker	Frank RIJSBERMAN Director-General, Global Green Growth Institute
Discussant	Nelson DEVANADERA Executive Director, National Palawan Council for Sustainable Development, Philippines Scott BAUM Professor, Griffith University, Australia António ABREU Vice Chair, European Environment Advisory Council, Portugal Mahesh PRADHAN Chief, Program Management, International Environmental Technology Center, UNEP
Rapporteur	JANG Kwang-Sub Researcher, UNESCO World Network of Island and Coastal Biosphere Reserves Jeju Office

— **Frank RIJSBERMAN** Starting with the Brundtland Report in 1987, various terms for ecological efficiency and green growth have circulated at the World Business Council For Sustainable Development(WBCSD) in 1992 and the Rio+20 Conference 2012. The Global Green Growth Institute(GGGI) engages in activities to support countries around the world in their transition towards a new model of green economic growth, that is environmentally sustainable and socially inclusive. First of all, the GGGI is dedicated to developing policies, mobilizing investment and sharing knowledge to implement the concept of eco-efficiency. Mainstreaming the concept of eco-efficiency requires us to meet Nationally Determined Contribution(NDC) targets and achieve Sustainable Development Goals(SDGs). Today, countries over the world are making diverse efforts to achieve a carbon-free society. India lowered solar energy prices and stopped the operation of coal-fired power plants this year; and China's renewable energy accounts for 80 percent of its total use of energy. However, many Asian countries suffer from serious air pollution due to coal-fired power generation, rais-

ing concerns that they may face more serious consequences unless they invest in renewable energies.

Even though U.S. President Trump decided to break away from the Paris Agreement, other countries still have a firm will to meet the NDC targets. South Korea, China and Japan, which account for 76 percent of electricity production and consumption in Asia, and Russia are studying a way to jointly establish an energy grid, with China considering a measure to supply new renewable energies with its Green Belt initiative. The GGGI engages in various activities to support efforts to achieve green cities, water sufficiency, and sustainable landscapes and energies. With a strategic partnership with the Green Climate Fund(GCF), the GGGI mainly supports governments but it also cooperates with the civil sector, such as banks, investors and business enterprises pursuing eco-efficiency. I wish Jeju Island could introduce a carbon-free society by creating a network dedicated to green growth and eco-efficiency.

Green growth and eco-efficiency can work hand-in-hand to promote carbon-free, climate resilient and inclusive societies. Jeju's leadership in reaching

a carbon-free society can be shared with other countries through the GGGI's member network. Rapidly falling prices of clean energy and energy storage are making green growth and eco-efficiency economically attractive.

— **JEONG Dai Yeun** Director-General Rijsberman has explained about the role of the GGGI and advised that the public and private sectors should cooperate with each other to achieve a carbon-free society by properly addressing energy supply and demand issues, and the transition to new renewable energies. In particular, he concluded that Jeju should form a network to pursue a carbon-free island in cooperation with public institutions.

— **António ABREU** I would like to discuss how to make the technical terms related to carbon-free efforts easy to understand, though they are accepted in industries without any difficulties.

— **Nelson DEVANADERA** The GGGI has had an operation on Palawan Island. The movement to cope with climate change in the Philippines started with Eco-town. We should start from a low carbon society and pursue carbon neutrality and ultimately to carbon zero. This would be possible through legislative activities.

— **Scott BAUM** Government policies or agendas undergo changes whenever the ruling camp is replaced by another party, thus making it utterly difficult to maintain their sustainability.

— **Mahesh PRADHAN** U.S. President Trump announced that the U.S. would suspend its contribution to the Green Climate Fund. I would like to ask what kind of creative approach should be made toward the issue. I would also like to hear a detailed explanation about the green economic partnership of the GGGI.

— **Frank RIJSBERMAN** Green growth is an important issue, but I know that it might be pushed to the sidelines when new governments take office. However, as environmental issues are important, emphasis will be placed on them, by whichever terms they might be called. A green economy should be defined by a single concept, but we may rest assured that the definition will not affect how it is promoted. The

central government is not the only one responsible for green growth, as local governments have their own roles, too. President Trump's suspension of the contribution caused delays in the plans of the GCF, but these might be resolved by the efforts of the private sector. The GGGI and GCF support green growth in 14 countries and suggesting new solutions by collecting a variety of opinions through its partnership. The fund is now in transition, but I am positive about its prospects.

— **JEONG Dai Yeun** Let us define the concepts of "carbon low," "carbon neutrality" and "carbon zero."

— **Scott BAUM** All of them are the means to realize green growth and about lessening the effect of climate change. We move from being carbon low to carbon neutral and to carbon zero. As societies are in their own stages, it is important to judge in which stage a society is.

— **Nelson DEVANADERA** Carbon zero status is achieved when the amount of absorbed carbons is larger than carbon emissions. To achieve this, a country should have many forests, like the Philippines. I expect Palawan Island can achieve a carbon zero society as Jeju aspires to achieve its carbon-free island by 2030.

— **António ABREU** Each society should implement policies proper to its own condition. Principe Island is an eco-friendly spot, where nature and mankind coexist without energy. In the Canary Islands, only renewable energies are being consumed. We have to be open to various concepts without sticking to a single objective.

— **Frank RIJSBERMAN** After the Paris Agreement, countries are required to assess and report their emissions of greenhouse gases and make efforts to clearly define the terms. Through consultations with South Korea, the Philippines, Australia, etc., incentives will be given to greener countries.

— **JEONG Dai Yeun** The three concepts are all correlated with climate change. Countries have their own point of entry into a green economy and different roles.

— **António ABREU** Safety and environmental man-

agement are not separate concepts but belong to a broader one, with many industrial sectors, involving manufacturing, tourism and water resources, affecting eco-efficiency. In the past, green certificates used to represent the burden of financial costs, but now it is trustworthiness.

— **Nelson DEVANADERA** With cooperation in technology to improve efficiency, we can reduce energy consumption. By improving eco-efficiency, we can move forward. Palawan Island is cooperating with a Thai foundation for eco-efficiency.

— **Mahesh PRADHAN** To improve ecological efficiency, we should consider raising the efficiency of limited resources.

— **JEONG Dai Yeun** For next topic, I would like to ask advice on the Carbon Free Jeju Island by 2030 goal.

— **Mahesh PRADHAN** Citizens' lifestyles should change. To this end, we need environmental education like that offered by the Asia Climate Change Education Center.

— **Scott BAUM** In addition to the top-down policymaking by the government, bottom-up policymaking by the non-governmental sector is also necessary, as the government might reel from its responsibility for the policies. All policy actions should be integrated while maintaining a balance between conflicting interests.

— **Nelson DEVANADERA** A leader is necessary for the political mechanism. A cooperative system should be established between the public and private sectors for possible investments by the civil sector.

— **António ABREU** Jeju Island is known as a good example of environmental capital. The "Carbon Free Island Jeju by 2030" project needs citizens' participation and education. If eco-efficiency is taught as a regular course at public schools, instead of a supplementary one, it will redress the waste problem with popular campaigns

— **Frank RIJSBERMAN** There is no such thing as clean coal. If the government stops providing subsidies for fossil fuel use, it will certainly make environmental progress. As the agricultural sector produces a substantial amount of greenhouse gases, the carbon zero

policy should be implemented across the board.

The clean energy policy of Asia is essential in responding to climate change and air pollution. As a carbon-free society and clean air are closely related to each other, clean energy must be used for transportation systems.

— **António ABREU** After all, it boils down to the importance of education. Education is necessary to bring a change to the attitude and values of citizens. Social institutions also should learn ecological approaches.

Keywords

Carbon Free Island Jeju 2030, Ecological efficiency, Green growth, Carbon low, Carbon neutrality, Carbon zero

Policy Implications

- As energy resources are limited, we should improve the efficiency of the use of resources.
- It requires not only efficiency in energy use, but also advanced technology to store, sequester and absorb carbon to minimize the environmental implications of energy consumption.
- As the approaches to the objective of being carbon low, carbon neutral and carbon zero are all different, so should the methods to pursue these goals vary.
- To improve the efficiency of policies based on social consensus, new governance should be established so that local residents, experts and stakeholders, including industries, may join the process of policymaking.
- How to supply clean energy should be included in the eco-efficiency agenda of Jeju Island.
- As waste is one of the serious issues of small islands, including Jeju, a priority should be given to waste management.