Designing a Multilateral Scheme to Encourage Technology Innovation and Transfer to Reduce Greenhouse Gas Emissions in the Asia-Pacific Region

Extended Abstract # 018

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INTRODUCTION

While the international negotiation on climate change does not make much progress in designing the post-Kyoto scheme, technology innovation and transfer is becoming a central issue in the negotiation. In Cancun last year, the parties agreed to organize the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN). However, no concrete proposals have been put forward as to what institutional arrangements to establish in order to promote renewable energy as well as energy efficiency improvement technologies in the developing countries.

This paper examines a possibility of building a multilateral framework to encourage technology innovation and transfer to reduce greenhouse gas emissions in the Asia-Pacific region. The author argues that different institutions need to be designed for each stage of technological development. The economic policy instruments such as the Clean Development Mechanism (CDM) may be effective to encourage technologies at the diffusion and commercial stage, while the empowerment of the network of research groups are needed to encourage technologies at the demonstration and deployment stage.

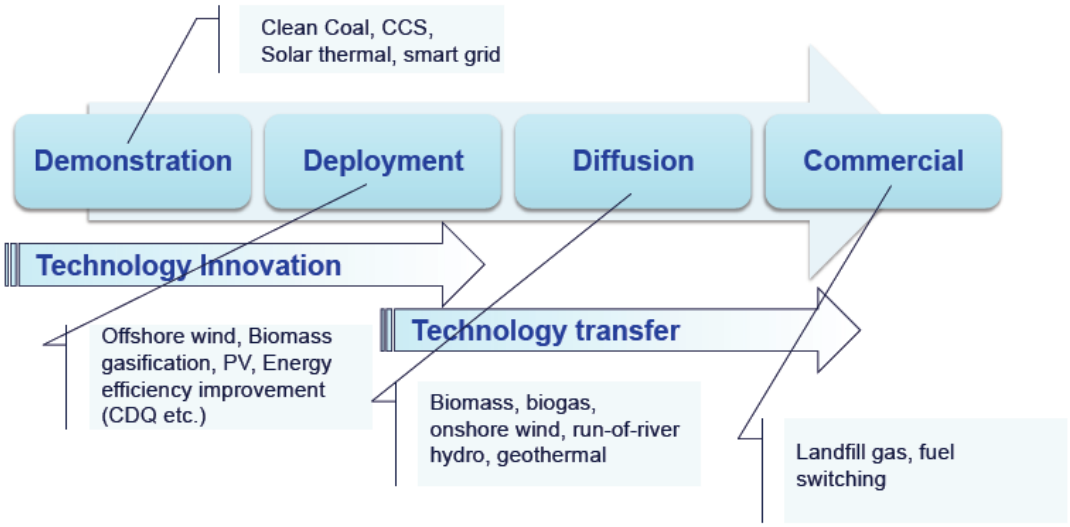
The paper also introduces a research area that attempts to analyze barriers in technology innovation and transfer in the Asia-Pacific region. It stresses that these barriers need to be considered in designing a multilateral scheme to expand renewable and energy efficiency improvement technologies and reduce greenhouse gas emissions in the region.

STAGES IN TECHNOLOGICAL DEVELOPMENT

Innovating a new technology and transferring an existing technology from one area to

another have been discussed separately in the study of public policy as well as business management. In the past, this tend was observed in policy discussions on climate change and new energy development. While experts recognize technologies such as clean coal, carbon capture and storage (CCS), solar thermal as the technologies necessary to be developed for the low carbon future, they regard technologies such as wind power, solar photovoltaic (PV), and mini-hydro as the technologies that have reached the level of transfer from the developed countries to the developing countries. Recently, however, there is a growing understanding among the experts working on technology issues related to climate change that it is essential to discuss innovation and transfer of technologies under the same framework. Figure 1 indicates four stages of technological development covering both innovation and transfer. It also provides several examples of specific technologies along the development:

Figure 1: Stages of technological development and examples of specific technologies along the development.[12]



The author argues that, while innovation and transfer of technologies are to be discussed under the same forum, different institutional designs are necessary to promote technologies for each stage of technological development. In the early stage of development, national as well as international supports for research and development efforts are critical. In fact, at the

[1] This figure shall be only treated as a conceptual flow of technological development. The actual mapping of the technologies depends upon various conditions of each country or region. It is also to be noted that the four stages are not clearly separated in reality as it is shown in the figure.

[2] The original version of this figure is contained in UNFCCC, *Advance report on recommendations on future financing options for enhancing the development, deployment, diffusion and transfer of technologies under the Convention: Note by the Chair of the Expert Group on Technology Transfer*, 2009 (FCCC/SB/2009/2). The author modified the figure by adding specific technologies along the technological development.

bilateral level, there have been several initiatives to build and empower a network among research institutions, for example, between the EU and China, the US and India, Australia and several developing countries that are interested in CCS. At the multilateral level, while there have not been remarkable efforts excepts the Asia-Pacific Partnership on Clean Development and Climate (concluded in April 2011), there are industry-based programs for technology innovation including the Technology Breakthrough Program in the steel sector, the Cement Sustainability Initiative in the cement sector, and the Carbon Sequestration Leadership Forum in the electricity generation sector. The author is currently classifying the main characteristics of these initiatives and programs.

At the later stage of technological development, the economic policy instruments such as CDM may be recognized as an effective multilateral mechanism to encourage technology transfer to the developing countries. The bilateral crediting mechanism as well as an expansion of project-based CDM into the sectoral or program mechanisms can be also a promising policy candidate for technology transfer in the post-Kyoto regime. At the national level, an introduction of feed-in-tariff program is receiving a greater attention recently among the developing countries in the Asia-Pacific region, while other economic instruments such as subsidy, emissions trading, and renewable energy certificate scheme may also be seen as a policy tool to attract technology manufacturers and investors from the developed countries.

OBSTACLES IN TECHNOLOGY INNOVATION AND TRANFER

There are three research directions to examine a possibility of innovating new technologies and transferring renewable energy and energy efficiency improvement technologies. The first direction is to look into the “potentials” in diffusing the technologies and reducing greenhouse gas emissions through the introduction of the technologies. There are numerous studies in the Asia-Pacific region to estimate the potentials. An example would be research initiatives estimating the potentials of biomass and biogas power generation based on available resources of biomass and biogas in the region. The second direction is to assess the “needs” of the technologies among the developing countries. Research in this area is typically conducted through face-to-face interviews and/or survey among the policymakers and project developers. For example, there is an needs assessment study targeting at several non-Annex I countries under the United Nations Framework Convention on Climate Change (UNFCCC).[3]

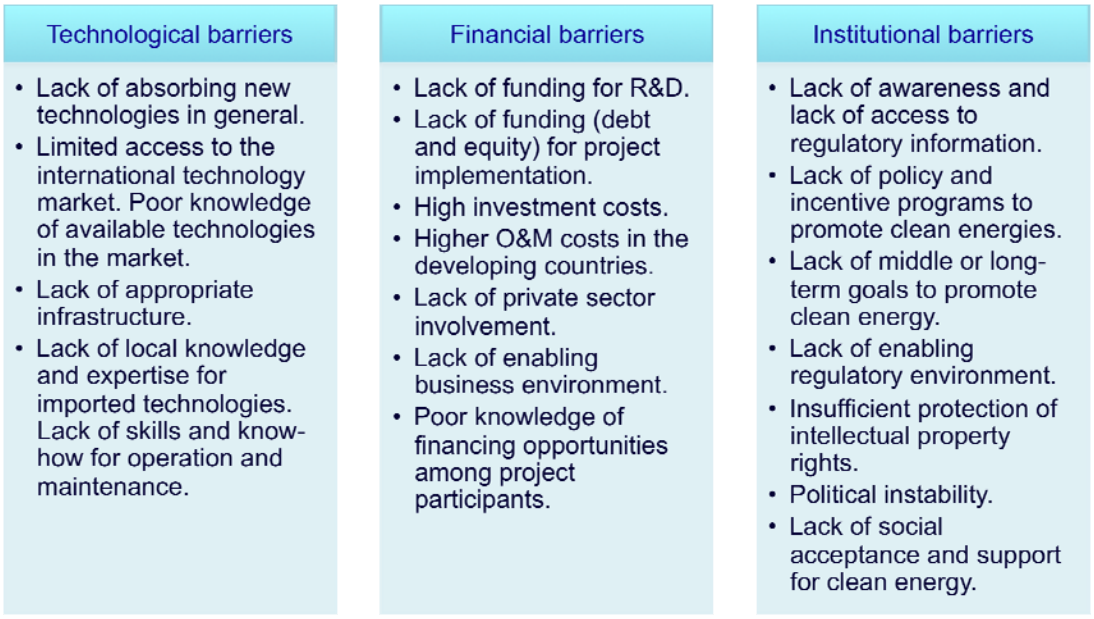
The research direction that leads to important lessons in designing a national and

[3] The results of the study are summarized in the following report: UNFCCC, *Second synthesis report on technology needs identified by Parties not included in Annex I to the Convention*, 2009 (FCCC/SBSTA/2009/INF.1).

international institution is to analyze “barriers” for technology innovation and transfer. Research in this direction typically takes the form of case study examining barriers for diffusing a specific technology in a specific country or region. An example is a study conducted by the University of Sussex Energy Group examining barriers for diffusing five technologies in India including 1) wind power, 2) solar PV, 3) hybrid vehicles, 4) energy efficiency in small and medium sized enterprises, and 5) integrated gasification combined cycle (IGCC) for power generation.

The author is currently summarizing the results of the barriers identified through the case studies that have been conducted by several institutions. Tentative results of the work indicate that these barriers are broadly classified into three areas including technological, financial and institutional as presented in Figure 2:

Figure 2: Technological, financial, and institutional barriers.[4]



It is essential to consider these barriers in designing a multilateral scheme to expand renewable and energy efficiency improvement technologies and reduce greenhouse gas emissions in the Asia-Pacific region. The author will provide details of the study on the barriers at the conference.

ACKNOWLEDGEMENTS

[4] The figure contains major barriers observed in various case studies. There are other barriers that need to consider in some cases. It is also noted that some barriers may not be exactly categorized into one classification since they may be related to another classification.

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KEY WORDS

Technology transfer, technology innovation, multilateral institutions, renewable energy technologies, energy efficiency improvement technologies