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Electric power grid interconnection in Northeast Asia

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Abstract

In spite of regional closeness, energy cooperation in Northeast Asia has remained unexplored. However, this situation appears to be changing. The government of South Korea seems to be very enthusiastic for power grid interconnection between the Russian Far East and South Korea to overcome difficulties in finding new sites for building power facilities to meet its need for increased electricity supplies. This paper analyzes the feasibility of this electric power grid interconnection route. The issues addressed include electricity market structures; the prospects for electric power industry restructuring in the Russian Federation and South Korea; the political issues related to North Korea; the challenges for the governments involved and the obstacles anticipated in moving this project forward; project financing and the roles and concerns from multilateral and regional banks; and institutional framework for energy cooperation. While there are many technical issues that need to be resolved, we think that the great challenge lies in the financing of this commercial project. Thus, the governments of the Russian Federation and South Korea involved in the project need to foster the development of their internal capital markets and to create confidence with international investors. To this end, on energy side, this involves defining a clear energy policy implemented by independent regulators, speeding up the already started but delayed reform process of restructuring electric power industry and markets, and establishing a fair and transparent dispute resolution mechanism in order to reduce non-commercial risks to a minimum. The paper argues that establishing a framework for energy cooperation in this region will contribute positively towards that end, although views differ regarding its specific form. Finally, given that North Korea has a crucial transit role to play and faces a very unstable political situation, it is concluded that moving the project forward needs to be contingent on a resolution of the North Korea's nuclear crisis.

Keywords: Electric power grid interconnection; Northeast Asia; Energy charter treaty

1. Introduction

Northeast Asia (NEA) is part of larger Asia–Pacific community. It includes China, Japan, Mongolia, North Korea, the Russian Federation, and South Korea. In spite of regional closeness, energy cooperation in NEA has remained unexplored. Energy cooperation in NEA, especially in the power sector, has so far been considered only a subject for discussion and research among related professionals. Even though power sector cooperation in NEA has a great potential, there has not been much progress. By contrast, in other parts of the world, such as in Europe, Southeast Asia, South America, North America, and even in Africa, power sector cooperation has been specifically enforced and has provided good results (APERC, 2000; Uprety, 2002; Bernard et al., 2003).[1] The benefits from power sector cooperation in these regions are jointly shared.

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[1]The successful examples of cross-border power sector cooperation include NordPool and power exchanges between England and France in Europe, Thailand and Lao PDR, Peninsular Malaysia and

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Regarding the possibility of energy cooperation in NEA, there are strong complementarities between the energy production and consumption structures of this region (Bae, 2004). On the one hand, the Russian Federation is the only country in the region with energy capacity to export to other countries. On the other hand, China, Japan, the Democratic People's Republic of Korea (North Korea), and the Republic of Korea (South Korea), as energy consuming countries, are seeking stable energy sources within the region to diversify their sources of traditional energy supplies.

Nevertheless, the heterogeneous structures between NEA countries as well as the differences in economic development are among factors impeding energy cooperation including power sector cooperation. Especially, a disagreement due to the division of North Korea and South Korea is a unique factor that acts to impede peace and economic cooperation in NEA compared to other parts of the world. However, these impeding factors provide good opportunity to produce more profits through cooperation. Put to good use as a tool for peace, energy cooperation in NEA could relieve tensions between North and South Koreas, contribute to regional and global peace and security, and allow these countries to enjoy the accompanying economic benefits.

The situation appears to be changing along with the inception of natural gas pipeline projects and electric power interconnection plans. In the NEA countries, there are growing interests in energy cooperation. The development of gas fields in Sakhalin, or the Korean Peninsula Energy Development Organization (KEDO) project in North Korea has exemplified large-scale energy cooperative projects progressing in NEA. Recognizing the importance of such cooperation, a joint declaration was drawn at the inter-governmental meeting (organized by the United Nations Economic and Social Commission for Asia and the Pacific) in Khabarovsk, Russia, in October 2001, reflecting the opinions of the NEA countries. There is an article on the major agendas of that declaration, which states that a cooperative committee will be formed with government officials to deliver a realistic cooperation plan on energy, including power sector cooperation. Also, a preliminary meeting to form the committee was held in Seoul, South Korea. Even though there has been no indication of progress after this preliminary meeting, it is significant in that there was a specific attempt to form the committee in a short period of time.[2]

Fig. 1. Alternative routes of power grid interconnection in NEA. Source: Park et al. (2004).

There is no doubt that there are economic, social, and environmental benefits to reap from any power grid interconnection project. Such a project will help lower financial requirement for infrastructure development, improve energy resource allocation for environment, and bring in monetary gains from regionally competitive pricing. Not only these measurable benefits but also such intangible benefits as strengthening energy security and regional ties with neighboring countries may well be generated from the project.

Despite these potential benefits of power grid interconnection, the attitude of the countries involved do differ. Given that 70% of its territory is covered with mountains and the residents are reacting extremely negatively to the construction of power facilities, South Korea faces great difficulties in finding new sites for power facilities. To overcome such difficulties in meeting the need for increased electricity supplies, the government of South Korea seems to be very enthusiastic for power grid interconnection between the Russian Far East and South Korea, although the government has not officially endorsed it yet.

Several possible electric power interconnection routes have been proposed. One route is the link between the Russian Far East and South Korea directly via North Korea, as shown in Fig. 1. Simply, this route assumes trading of electricity between the Russian Far East and South Korea with the construction of high voltage direct current (HVDC) transmission lines passing through North Korea.[3] According to the preliminary analysis by KERI (2004), the approximate distance of this interconnection route would be 1260 km. Also, it is assumed to take 5 yr to construct the interconnection line and its

(*footnote continued*)
Singapore, and Peninsular Malaysia and Thailand in Southeast Asia, OLADE (Organización Latinoamericana de Energía) in South America, power trading between Canada and PJM (Pennsylvania–-New Jersey–Maryland) in North America, and SAPP (Southern African Power Pool) in Africa.

[2]Starting from December 2002 to November 2005, the South Korean Ministry of Commerce, Industry and Energy has sponsored a comprehensive project titled as Development of Cooperational Infrastructure for Northeast Asia Region Electrical System Ties (NEAREST). This project includes construction of data base, technical feasibility, economic feasibility, and market feasibility of NEAREST. For further information, see the project's web site at: http://nearest.keri.re.kr.

[3]HVDC is a proven technology employed for power transmission (APERC, 2000; KERI, 2003).