Policy Forum 97-07: Innovative Approaches to Financing Environmentally Sustainable Energy Development in Northeast Asia

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"Innovative Approaches to Financing Environmentally Sustainable Energy Development in Northeast Asia"

By Dr. Hossein Razavi

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Hossein Razavi heads the Oil and Gas Division at The World Bank and is the author of *Financing Energy Projects in Emerging Economies* (Penwell Books, 1996). In this capacity, Dr. Razavi interacts extensively with the international energy industries including utilities and public and private financiers in developing countries. In this paper, Dr. Razavi addresses his expertise to the situation in Northeast Asia.Northeast Asia will make large energy investments in the coming decade. Currently the primary technology alternatives are perceived to be coal and nuclear power. Both are deeply problematic on both environmental and security grounds. They may also be sub-optimal on financial grounds compared to a third alternative based on waste minimization: coal with sulfur emission controls; fuel switching; and energy efficiency. Given large capital requirements - and scarcity-incentives will be strong to optimize investment by selecting least-cost projects.

This report examines the emerging methods of financing power investments in the countries of Northeast Asia (Japan, China, Taiwan, South Korea and North Korea) to assess the availability of funds for future investment requirements, and to investigate the impact of financing on environmental sustainability of energy development in these countries. It also identifies opportunities for using innovative methods of financing to reinforce sustainable energy development and provides several proposals for international cooperation in dealing with financial challenges in the energy sector of the region.

Summary

Investment requirements of the power sector in Northeast Asia is projected at an average rate of $72 billion per year over the next 15 years. This huge requirement has raised concern about the ability of the power entities to mobilize the necessary finance, and has triggered substantial changes in methods of financing.The emerging methods of financing power investments are likely to enable the countries in the region (North Korea being an exception) to mobilize the required funds and to meet the future power needs of these countries. However, the new methods of financing are also likely to have some undesirable impacts on sustainablity of energy development in the region. The undesirable impacts stem from the changes in the decision-making processes and incentives. First, the governments will lose their tight grip over energy policy. Thus, some of the projects and targets which had been set by governments in line with national priorities may not be achievable any longer. Second, the vast number of emerging Independent Power Producers (IPPs) will be based on the financial incentives of private investors which normally aim at projects with short payback period. The undesirable impacts will be primarily in two areas: (a) The mix of power generating capacity; and (b) energy conservation programs.

The Impact on the Mix of Generating Capacity. If left to a free market mechanism, the mix of generating capacity would shift from nuclear and hydroelectricity to thermal power plants. Within the thermal group, natural gas would be developed if available. When reaching the limit of gas availability, the emphasis would shift to coal and perhaps oil-fired plants. The plant technology would be chosen to minimize the up-front investments while meeting the mandatory emission standards. Thus, the main source of

power would be by default conventional coal-based plants, while nuclear, hydro, imported gas, and clean-coal technology would receive insufficient attention.

In the countries of Northeast Asia, the government policy will continue to influence the mix of generating capacity and prevent it from being limited to thermal plants. In Japan and South Korea, the governments are likely to manage the fuel mix and enforce the diversified targets set by the national energy policy. In China, the government's control over the fuel mix will be substantially reduced. Hydropower and clean-coal technology are likely to be adversely affected. In Taiwan, the political momentum has shifted to IPPs and to providing the bidders with the flexibility to choose the type of plant they want to build. Nuclear options are likely to suffer a serious set-back. Natural gas is presently a favored option. However, it could suffer when gas requirements reach the capacity of import facilities. At such a juncture, expansion of gas imports would require substantial up-front investment and may not be attractive to private investors.

The Impact on Energy Conservation. There are a number of arguments and counter-arguments about the possible failure of a free market system in optimizing energy use, and the need for government support for energy conservation programs. It is, nevertheless, generally accepted that energy would not be used at an efficient level if (a) energy prices do not reflect the full economic and environmental costs; and (b) imperfect capital markets and deficiency in the availability of information cause under-investment in energy conservation.

The countries of Northeast Asia have taken energy conservation seriously. In Japan, energy conservation has been, by all accounts, a success story and can provide useful lessons for other countries. In South Korea, energy conservation has been relatively successful and will continue to receive considerable attention. In China, there has been some significant progress in improving energy efficiency but the program is seriously threatened by the new market incentives. In North Korea, energy efficiency has received some political attention but lacks an effective means of implementation.

The Use of Innovative Methods of Finance in Improving Sustainability

Most methods of power sector financing in the countries of Northeast Asia are innovative. Countries in the region are among the world pioneers in drawing upon resources of emerging capital markets, private finance and private investment. However, due to their short track record, the impact of these methods on various aspects of development are not fully known. Thus, as the countries in the region experience with these methods, some undesirable impacts may become evident. To remedy these impacts, one may have to modify the present methods or introduce other innovative methods of financing to offset the undesirable impacts.Considering the emerging trends in the region, there are four areas in need of immediate attention.

1. **Premium for Use of Imported Gas.** As mentioned previously, the new incentive systems are likely to have an adverse effect on nuclear, hydro, and imported gas. The nuclear option is likely to remain political and is likely to receive attention from the government of each country. The hydro option has to be dealt with on a case-by-case basis, due to the specific parameters of each project. However, the gas option can be addressed in a more generally applicable framework. It would require a financial

system, and correspondingly a modified bidding process to encourage private bidders to take account of the environmental benefits of gas and to invest in gas import and gas-based power generation. The main target countries will be China, Taiwan, and in the longer term, North Korea.

2. **Reducing Risk in Using Clean-Coal Technology.** The use of clean-coal technology in the region has very large potential benefits. However, these technologies are mostly new and some untested on a large commercial scale. Application of these technologies in the region is now limited due to uncertainties about the cost and operational performance of plants using such technologies. There is a need to devise a financial system which can reduce the risk based on insurance, guarantees and other methods of risk mitigation. The target countries would be China, Taiwan, South Korea, and at a later stage, North Korea.
3. **Providing Financial Incentives for Energy Conservation in China.** In China, energy conservation offers significant potential gains in both economic and environmental terms. The government has established, during the last 10 to 15 years, a solid program of physical control systems, financial support, R & D, information dissemination and training. Also, substantial progress has been made through more objective energy pricing induced by the recent market reforms. However, the same market reforms have caused a gradual dismantling of the energy conservation program, mostly because the government is withdrawing its support and leaving it to the market to take care of the matter. The challenge is to redirect the program to the new market environment before it loses its powerful ingredients.
4. **Providing Technical and Financial Assistance to the Energy Sector in North Korea.** The power and the industrial sectors in North Korea are in serious need of rehabilitation and retro-fitting. These improvements are expected to be very cost effective. Nevertheless, the required investments are not undertaken because of institutional, technical, and financial constraints. A program of assistance to deal with these constraints would be of tremendous value to North Korea and could even be justified on the basis of regional and global environmental benefits. The program should initially concentrate on the rehabilitation needs of the power sector.

Prospects for International Cooperation

In all of the above areas, there are excellent prospects for international cooperation. More specifically, the following synergies can offer significant mutual benefits:

1. In regard to encouraging natural gas imports, the Japanese new approach to the regional energy policy becomes relevant. Japan has now expanded its concerns about energy security and environment beyond its borders. Accordingly, it is willing to support gas imports to the region because they would serve both concerns. In addition, Japan has significant comparative advantage due to its dominance in the LNG market and its ability to provide financial support.
2. In regard to clean-coal technology, both Japan and the United States have invested heavily in the development of these technologies. So far these investments have not resulted in noticeable return because the developed technologies have not been adopted on a commercial scale. The largest potential market for these technologies is the Asia region. Thus, marketing the technologies in China would serve the U.S. and

Japanese commercial interests as well as local and regional environmental goals.

3. In regard to energy conservation in China, a combination of the Japanese and U.S. experience would provide an almost ideal approach to the matter. The Japanese experience offers very strong policy and technical contents while the U.S. experience is in institutional and market-oriented financial incentives. The donor community may be willing to contribute to financing the energy conservation efforts based on regional and environmental benefits, and perhaps, within the framework of Joint Implementation.
4. With regard to technical and financial assistance to North Korea, international cooperation can be of mutual benefit because energy efficiency improvement fits in the philosophy of self-reliance to which North Korea adheres religiously, and offers significant potentials for reducing regional and global environmental damages, which appeals to many countries in the international donor community. Again, the donor community may also be willing to finance the required investments within the framework of Joint Implementation.

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1. This paper suggests that the emerging methods of financing power investments will cause undesirable impacts in the mix of generating capacity and energy conservation programs. Do you agree, and if so, what measures can be taken to prevent these problems?

2. Dr. Razavi offers a number of areas for international cooperation to promote a sustainable energy future in the region. Which do you think is most promising and why?

3. This paper suggests an increasing role for the private sector in financing energy development. What are the environmental and security implications of this trend, and what are possible measures to mitigate negative impacts?

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