

Key Issues on Nuclear Energy Non-proliferation in East Asia

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1. Introduction: Why East Asia?

Energy demand in East Asia casts a significant challenge to sustainable economy development and socio-political stability in the region which has experienced tensions throughout the history. The energy demand in this region has been dramatically increased since the start of reform in PRC. DPRK is another challenge. The current electricity consumption in DPRK is around 10% of that in ROK. If the economy of PRC continuously grows to the level of neighboring states and if the living standard of DPRK reaches that of ROK, the energy and electricity demand in the region will certainly be out of control unless the proper measures are taken into actions from today. The only feasible energy option is the nuclear one. PRC already proclaimed its ambitious plan to deploy more than 30 reactors in the near future. In addition, a couple of the South Eastern Asian states expressed their willingness to introduce nuclear power plants in the future.

The increase in the use of nuclear energy is expected to bring up the nuclear renaissance in the region. However, without the proper mechanisms to supply fresh fuels and to manage spent nuclear fuels with full compliance of nuclear energy non-proliferation, the new development will inevitably cause the instability in the region.

So far many interesting proposals on nuclear cooperation in East Asia were announced. Unfortunately, none of them works out properly yet, partly because the old proposals were too political. To restart the engine of the nuclear cooperation and non-proliferation in the region, it is necessary to find out what would be the common interests of the region not so much related to politics. In this paper, some key technical issues are addressed for future regional joint studies.

2. Characteristics of East Asia

East Asia is unique in many senses. It can be divided into two

categories, North East Asia and South East Asia. These two sub-regions have different historical background as well as economy. North East Asia is composed of one P-5 country PRC, Japan, and ROK. Firstly PRC is the nation in the region with full nuclear arsenals. Japan has a full capability in nuclear energy, from the enrichment to the reprocessing with an active plutonium recycling program. ROK has a world class nuclear power generation program but without any national norms for spent nuclear fuel management yet. The situation is somewhat different in South East Asia.

Politically and theologically, East Asia shows a wide variety spectrum, from the free market economy to the old communism structure, from the mixture of Buddhism, Confucianism, and Christianity in the North East Asia to Islamism in Indonesia. From the top class GDP in Japan to the bottom class GDP states in the South East Asia. These differences have hindered any practical cooperation in nuclear energy, especially in the field of the nuclear fuel cycle.

However, the closer tied-up in the nuclear energy is essential to solve the potential problems on supply of fresh fuel, spent nuclear fuel management, and non-proliferation. The key area is the nuclear fuel cycle in association with strong non-proliferation measures. The successful regional cooperation needs a step by step approach. Several subjects for the regional joint studies are proposed considering characteristics of the region by regional experts. However in this paper, two issues, the Russian proposal and non-proliferation measures in technology development are discussed.

3. Technical Issues

International spent fuel storage and disposal option

The Russian proposal for the international and regional spent fuel storage option is not still fully matured politically, technically, financially, and legally.

<A Good Samaritan>

However, the idea of the joint storage and probably a repository looks attractive for many distinctive reasons. Firstly, it will relieve the burden of a plutonium mine from the non-proliferation point of view. Secondly, it will be a practical solution for many small countries such as old Eastern European countries which own a limited number of nuclear reactors without an enough fund and a potential management site. The same logic can be applied for a state in East Asia which would like to introduce nuclear energy in a small scale. In other words, it has a potential to be a part of a fuel leasing and take-back program for countries which would like to introduce nuclear energy but do not yet possess the full technologies for proper management of spent nuclear fuel. It also relieves the potential threat by sub-national nuclear terrorist groups by applying systematic surveillance systems.

To materialize this option, the proliferation resistant and economic transportation approaches between a sender and a receiver are to be constructed.

<Liability Issue>

The proposal will certainly create a lot of legal issues over the transfer of liability between a sender and a receiver. What would be the liability for a sender after all spent nuclear fuel is in the hands of a receiver? This liability issue might not be so important for the option of interim storage. However, for a permanent disposal option, the time span for liability consideration is more than tens of thousand years. In that case is it possible for a sender to transfer all liability of spent nuclear fuel to a receiver after delivering all spent nuclear fuel to a receiver with full advanced payment? Also, what is the meaning of full payment and is it practical to talk about the full payment for a receiver who should worry about the potential long term burden which might not be foreseen today.

< Technical Challenges>

If the storage and disposal option is implemented, there are series of technical issues such as differences in transportation

systems, quality assurance, regulations for licensing, post-monitoring systems, etc.

These questions should be addressed and examined in detail for concerned neighboring states before seriously considering the Russian proposal. The regional study is needed to examine all the issues over the Russian proposal.

Non-proliferation measures in the technology development

Non-proliferation is a political issue at one side and a technical issue at the other side. In essence, confidence building is the key to assure non-proliferation measures.

<Understanding the Technical Basis of Neighboring States>

In the region, other than the DPRK nuclear issues, there are a couple of non-proliferation issues; one regarding Japanese fuel cycle facilities, such as, whether there is excessive plutonium in Japan presently and in the future. The other is regarding the innovative technology development for future nuclear fuel cycle. To understand why a certain country pursues a certain fuel cycle policy and a research and development goal, it is quite important to understand the energy and nuclear energy situation of that state and a viable spent fuel management option carefully.

<Innovative Fuel Cycle Technology Development>

In the region, the proper management of spent nuclear fuel becomes a big concern. The GEN-IV and INPRO are two good examples to deal with future energy demand and the minimization of waste volumes.

4. The Way Forward

The regional study is needed to assess the three aspects; energy outlook, the role of nuclear energy, and a national measure to manage spent nuclear fuels and find out the proper action plans to assure the non-proliferation.

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