

## **Recent Movement, Issues and Some Counterplans in Nuclear Industry**

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### **1. Introduction**

There is no doubt “Nuclear Energy” is the only source that can ensure the world’s steady development in the foreseeable future. Nowadays is definitely what is called “renaissance of nuclear.” As energy demand and economy increase, and global climate warms, the trend of nuclear dependency will be accelerated further.

With 30 reactors being built around the world today, another 35 or more planned to come online during the next 10 years, and over two hundred further back in the pipeline, the global nuclear industry is clearly going forward strongly. Countries are seeking to replace old reactors as well as expand capacity, and an additional 25 countries are either considering or have already decided to make nuclear energy part of their power generation capacity.

On the other hand, as current movement of world nuclear field, Korea has faced to one of the most important times since introducing nuclear power. Twenty nuclear power plants are run in Korea i.e. sixteen PWRs and four PHWRs now, and the capability of nuclear power production has been ranked world number six. In spite of this grand appearance, however, the influencing power on world nuclear society is not well matched to its status since it does not have a special hidden card which can appeal and impact on international community. In the era of nuclear renaissance, paradoxically, Korea is not in the situations of optimistic or pessimistic view.

Now let’s review and analyze these phenomena in world nuclear industry with more detail, and feedback the results to what Korea is to do at this crucial times.

### **2. Main Movement and Issues**

Jumping on the upper mentioned mood, several kinds of momentous movements have been perceived in the nuclear industry.

First, stocking up heavily with uranium gets more in spread. For example, Areva is trying to buy uranium mine or to cooperate with a region uranium mine company in Australia and South Africa. China and Japan also are

struggling to get uranium all around of world [1]. These sorts of circumstance stimulate uranium price which hits the highest \$ 138 per lb in last June this year [2]. This could be a severe burden to the uranium import country like Korea.

Secondly, the field of the enrichment of uranium has experienced a lot of changes such as scaling up its facility capability, establishing new company etc. And also efficient centrifuge technology is replacing the older energy-intensive diffusion technique and several plants are under construction in France and the USA. A new Australian process based on laser excitation is also under development sponsored by GE [1]. To do these activities needs a tremendous investment. From inferring the major enrichment company investment plans, around one billion dollars is necessary to set up the plant which produces “SWU” required in Korea setting aside having enrichment technology. Both things are act as obstacles to Korea in economy and politics.

In the next, many of the issues connected with nuclear power - energy security, climate change, nuclear safety and non-proliferation - are global in dimension. Consequently, several initiatives have been taken to promote international cooperation in research and trade i.e. GNEP (Global Nuclear Energy Partnership), GPNI (Global Power Nuclear Infrastructure), Fuel Bank etc [1], [4]. Through these initiatives, some leading countries are trying to monopoly the nuclear fuel and, by extension, take hegemony of world nuclear society. If Korea is not in a dominant position of this stream, it will fall in the passive nation in world nuclear industry so national nuclear technology, industry and energy security could be unstable by necessity.

Nowadays, most dominant nuclear companies span several countries, giving much enhanced international collaboration. The recent status of major strategic affiliation between these nations or firms is listed in the Tables 1 and 2[3]. As shown in Tables, it gives the important lesson that the correspondence of the mutual strategic interest is possible to make an agreement. This means that the possession of cutting edge, sensitive and original technologies, and uranium recourse can promote it easily. Korea, however, does not have any uranium resources and a sensitive technology which have been tabooed for a long time and is in the policy of “wait and

see” or other leading technology. During floating of the national nuclear policy, the temporal storage capacity of spent nuclear fuel will reach the limit in the coming 2016[4], which is coming to us as a dark shadow for the sustainable nuclear power generation.

### 3. Some Counterplans

Some counterplans to the former issues are suggested as follows by diagnosing the international circumstances connected with the domestic status.

Regarding the uranium resources, the participation on the shares of uranium mines, probing and enrichment companies is a good way to secure it with safe and economic. The government shall support these activities with diplomacy and capital considering the keen international competition in procuring uranium. For the reference, N. Korea is known to retain uranium resource around five times of the total world deposits [1]. It is continuously needed to observe and interest this fact. It, however, could not be an absolute way to obtain the uranium resources from the viewpoint of long term. Finally, it is necessary to get a new fuel cycle technology which can obtain an energy resource from the current Korean nuclear cycle.

In the next place, the spent fuel policy is set toward the close nuclear cycle system in considering the public acceptance, energy security, next generation etc. To close the cycle, the development of new reprocessing technology such as “pyroprocess” and FBR are essential under the reliable agreement for international non-proliferation regime in the long term. But this is far future plan and work in hand is to develop a realistic technology within at least around five years.

To cope with the initiative cartelization of the leading countries is firstly to strengthen the international cooperation and to concentrate on developing peculiarly core nuclear cycle technology while establishing the nuclear transparency and non-proliferation scheme. Japan is a good example. It has already been invited to GNEP as fuel supplier by US since they have their own advanced nuclear fuel cycle technology. Having an original technology makes it easier to tie with other leading country or company.

Therefore, using the unique infrastructure of Korea, a PWR-PHWR liaison cycle, is a realistic alternative. Especially making use of reprocessed uranium (RU) to fuel is a possible close way to come true and could appeal to the international nuclear industry. Those technologies have been already developed, and the time is to study the

practical application for commercial production. Especially there is a plenty of RU, i.e. around 25,000 tones [5] in the world so utilizing it is to recycle the spent fuel, to relieve its accumulation pressure, to get our own technology in the near time and to provide the base of getting the closed nuclear cycle in the far future even though it is sensitive matters.

Table 1. The status of nation-level cooperation

Nations		Contents	Remark
US	France, Japan, Russia, China	Underwriting Co-principles of GNEP	'07. 5
	Russia	Cooperation in R&D	'06. 12
	India	Cooperation Agreement	'06. 12
France	India	Cooperation Agreement	'07. 7
	Libya	MOU of Sea-to-Freshwater NPP	'07. 7
Russia	Ukraine	General Cooperation	'07. 6
	Kazakhstan	International Enrichment Center	'07. 5
	S Africa	Probing Uranium	'07. 2
China	Australia	Nuclear Mat'l Delivery, General Cooperation	'07. 1
	India	Strengthening Cooperation	'06. 11

Table 2. The status of firm-level cooperation

Firms		Contents	Remark
WEC	PBMR	Acquisition of ISTN	'07. 7
	Ukraine	Supply of 42 Fuel Assemblies	'07. 6
Toshiba	Kazatomprom	Selling 10% of WEC shares	'07. 7
	WEC	Buying WEC	'07. 6
AREVA	MHI	MOU of Joint Venture	'07. 7
	Urenco	Enrichment Plant	'06. 7
GE	Hitachi	Starting GE-Hitachi Nuclear Energy	'07. 6
Cameco	Kazatomprom	Uranium Conversion, Product	'07. 5
	Tenex	Probing Uranium, Development	'06. 11

### 4. Conclusion

Much commitment is urgently to be performed but utilization of RU is one of the most promising alternatives to solve the issues mentioned before from the tactic, strategic, realistic and long view points in Korea.

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