

North Korea's Intentions in Building a Small Light-Water Reactor

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1. Introduction

With North Korea's announcement that it is building a 25-30MWe capacity light-water reactor, the nuclear issue which had for some time been overshadowed by the Cheonan incident has re-emerged as a major concern. This message was conveyed by Dr. Siegfried Hecker, former director of Los Alamos National Laboratory in the US, and Jack Prichard, president of the Korea Economic Institute. These two individuals have taken a strong interest in the North Korean nuclear issue and have frequently traveled to and from Pyongyang, acting as messengers for the North Korean authorities. Dr. Hecker said he learned that the North was constructing a light-water reactor during his recent visit to Pyongyang, and added that since the construction had just begun it would take several years to complete.¹⁾ Mr. Prichard said that during his visit to Yongbyon from November 2-6 he was informed by the construction director of plans to build a 100MWe LWR (one-tenth the capacity of the 1000MWe LWR that had been under construction at Shinpo), and he observed concrete being poured and rebar being erected in the area where the Yongbyon cooling tower had been.²⁾

1) *Donga Ilbo*, Nov. 15, 2010.

2) *Yonhap News*, Nov. 17, 2010.

Usually LWR with a capacity of 100MWe or less are considered “small” such reactors are used in several locations around the world. There are some cases in which, due to geographical conditions or power consumption demands, a small-scale reactor is considered more appropriate than a large one. The 1000MWe LWR which currently serves as the main power source for South Korea is a representative large-scale model. In the field of nuclear energy, small-scale LWR technology has advanced as competition for the energy market has intensified; South Korea has made considerable efforts in this area as well.

2. North Korea’s persistent interest in light-water reactors

North Korea’s most recent expression of interest in possessing a LWR is nothing new. When the North Korean nuclear issue came to the fore in the early 1990s, the North Korean authorities claimed that the 5MWe reactor at Yongbyon was intended for the peaceful purpose of providing energy to the surrounding area. The 5MWe graphite-moderated reactor was capable of producing plutonium for nuclear weapons, and North Korea’s claims of peaceful use (which ignored the scientific fact that England had used a similar reactor to generate plutonium) were exposed as lies through an IAEA inspection. Subsequently North Korea continued to operate the 5MWe reactor and used the plutonium it produced to perform two nuclear tests; the country presently possesses several tens of kilograms of plutonium.

It is said that, before his death, Kim Il Sung had wished for denuclearization, stating “We have neither the will nor the capability to produce nuclear weapons.” Backed up by these words, North Korea has publicly claimed that it is only pursuing nuclear energy for peaceful uses, while concealing its secret efforts to develop nuclear weapons. The basic agreement concluded in Geneva in 1994, in which North Korea agreed to freeze its nuclear activities and shut down its facilities at Yongbyon in exchange for two 1000MWe light-water reactors to be built at Sinpo in Hamgyong Province, was a desperate attempt to stop North Korea’s nuclear programs and did not in any way signify that the international community believed the North’s claims of peaceful use of nuclear energy. Until the Foreign Ministry issued a statement on February 10th, 2005 publicly declaring, “We have developed nuclear weapons,” no one in North Korea - including Kim Il Sung and Kim Jong Il - had ever spoken of developing nuclear weapons.

It’s interesting that even after declaring their possession of nuclear weapons, the North Korean authorities continue to emphasize their peaceful use of nuclear energy and construction of a light-water reactor. At North Korea’s insistence, “peaceful use of nuclear energy” was explicitly

mentioned in Article 1 of the 9.19 Joint Declaration (concluded at the 6 Party Talks on September 19, 2005).³⁾ Even in 2010 the North Korean authorities made several references to light-water reactors. For example, at a press conference on March 25th a spokesman for the Korean Peoples' Army General Staff stated that hostile foreign powers "would be well advised to remember that the DPRK has a firm foundation of the independent national economy which remains solid despite any storm from outside. The DPRK will witness the appearance of a light water reactor power plant relying on its own nuclear fuel in the near future in the 2010s in the wake of mass-production of Juche iron and Juche-based vinalon cotton."⁴⁾

Further, on April 9th Chosun Shinbo printed the following text which hints at the true intentions behind North Korea's talk of light-water reactors:⁵⁾

Even though the US turns its back on peace talks and seeks to crush our system, we will hold fast to our policy of strengthening our nuclear deterrent while building up our economy through our own efforts. In the context of our vision for 2012, we have another plan which calls to mind the announcement of the suspension of denuclearization.⁶⁾ This is the development of uranium enrichment technology for the construction of a light-water reactor. The strategic increase of production is a key link to our economic revival plan, and we already clarified our intention to build a light-water reactor last year immediately after the UN Security Council took issue with our satellite launch. Our nuclear weapons were made using plutonium extracted at the Yongbyon nuclear facility. Our domestically built light-water reactor will add a new element to future denuclearization negotiations.

3. North Korea's capacity to build a light-water reactor

North Korea's economy is heavily distorted in support of its war industry, and its nuclear power industry is likewise considerably distorted when considered from the viewpoint of peaceful use. While it has invested heavily in the military objective of nuclear weapons development, North Korea's capability in the area of nuclear energy for civilian use is extremely poor. Technical

3) The relevant section of the document reads: "The DPRK stated that it has the right to peaceful uses of nuclear energy. The other parties expressed their respect and agreed to discuss at an appropriate time the subject of the provision of light-water reactor to the DPRK."

4) KCNA, March 29th, 2010.

5) *Chosun Shinbo*, April 9, 2010.

6) The "announcement of the suspension of denuclearization" refers to the statement "The process for the denuclearization of the Korean Peninsula will naturally come to a standstill," issued by the DPRK military representative to Panmunjom in response to this year's US-ROK joint exercises (Key Resolve, Foal Eagle). KCNA, March 7, 2010.

experts agree that North Korea has neither the technology nor the funds to build a small LWR. The basic principle and the nuclear fuel source are different from that of the graphite-moderated Yongbyon reactor, and even a small LWR at current prices would cost 500 billion won (for a 25-30MWe capacity reactor). It would be quite impossible for North Korea to build such a facility by itself.

4. North Korea's true intention in announcing its plan to build a light-water reactor and the implications

This raises the question of what North Korea's intention was in announcing to the world, via Dr. Hecker and Mr. Prichard, that it plans to build a small light-water reactor. Several theories are plausible; first, the announcement could be directed internally. A LWR could be promoted as evidence of North Korea's self-reconstruction and the technical/scientific merits of *juche*, and this could help to stabilize the succession by being promoted as one of Kim Jong Eun's achievements. However, considering that the regime chose to announce this reactor construction plan to the world, it appears likely that external aims are more dominant.

There may be several possible external aims behind this announcement. First, considering that North Korea has been seeking to move past the current phase of controversy brought on by the Cheonan incident and continuously sending signals of its willingness to rejoin the 6 Party Talks, they may be hoping to use the LWR card to raise interest in the nuclear issue and the 6 Party Talks, thus transitioning out of the current deadlock and into a new phase of North Korean aid. The recent signs of activity detected in the area near the nuclear test site in Kilju, North Hamgyong Province were obviously intended as a signal of plans to conduct a 3rd nuclear test and may also be part of the effort to break out of the current deadlock. Of course, North Korea continues to hold out the possibility of a 3rd nuclear test as one of its strategic cards.

Second, while reaffirming their claim of using nuclear energy for peaceful purposes, they have also clearly signaled that they expect to retain the right to build a light-water reactor even if the 6 Party Talks are restarted. This suggests that the LWR issue will become a major point of contention in any future denuclearization agreement. I.e., constructing a LWR will be the North's primary economic demand in return for denuclearization. On this point, it will be necessary for the 3 countries which led the Korean Peninsula Energy Development Organization (KEDO) - South Korea, the US, and Japan - to establish their positions. However, we must bear in mind that the equation may not be as simple as "light-water reactor = North Korean nuclear disarmament".

ment.” By viewing this reactor project as a simple matter of “compensating lost land by planting trees” we may be making a misjudgment, overlooking the strength of North Korea’s desire to possess nuclear weapons.⁷⁾

Third, the greatest significance of the light-water reactor card for external relations is that it lays the groundwork for establishing the North’s uranium enrichment project, which it has acknowledged since last year, as a *fait accompli*. Since the mid-1990s North Korea has been importing technology for a HEU program via illicit trade with Pakistan. This factor contributed directly to the eruption of the 2nd North Korean nuclear crisis in October 2002. The Clinton administration’s North Korea policy, which turned a blind eye to the North’s uranium enrichment program, received the harshest condemnation from the Republican Bush administration.

In response to North Korea’s 2nd nuclear test the UN Security Council passed Resolution 1874, prompting North Korea to acknowledge its uranium enrichment program for the first time via a statement from its Foreign Ministry on June 13th 2009, as follows:⁸⁾

Upon authorization, the Ministry of Foreign Affairs of the DPRK strongly condemns and rejects the UNSC “resolution 1874” and declares that it will take the following countermeasures at this early phase of all-out confrontation with the U.S. in order to defend the national dignity and the country’s sovereignty... The process of uranium enrichment will be commenced. Pursuant to the decision to build its own light-water reactor, enough success has been made in developing uranium enrichment technology to provide nuclear fuel to allow the experimental procedure.

This statement from the Foreign Ministry effectively put a stop to the domestic debate and conflict within South Korea surrounding the question of the uranium program’s existence. Now that the program has been acknowledged by the North Korean authorities themselves, they will need a means of justifying its continued operation; it appears that this small light-water reactor project will provide that justification.

A bigger problem is the fact that the uranium fuel used by a small light-water reactor must be more highly enriched than that of a larger model. Normally a large LWR uses a more fissile fuel material enriched to about 3-5% U235 isotope, but in a smaller LWR the enrichment level increases to 15-20%. Normally weapons-grade uranium must be enriched to over 90%, and as the enrichment level increases so does the ability to produce highly-enriched weapons-grade

7) *Donga Ilbo*, November 15, 2010.

8) KCNA, June 13, 2009.

uranium. Therefore if North Korea says it must produce 15-20% enriched uranium in order to operate this small LWR, there could be a serious problem. This will add another formidable obstacle to our efforts to denuclearize North Korea. The editors of *Chosun Shinbo* seemed to have this in mind in the April 9th article when they wrote, “Our domestically built light-water reactor will add a new element to future denuclearization negotiations.”