# Shedding New Light on North Korea's Nuclear Ambitions

**Nellwyn Olson**

## I. Introduction

As the United States confronts new and ever evolving security threats with innovative and adaptive thinking, there is one security threat that has persisted for almost a quarter of a century and has been met with repetitive alarms and cyclical reactions: the North Korean nuclear threat. Almost a decade ago, U.S. relations with North Korea were on an upswing with the October 2000 Joint communiqué expressing mutual interest in achieving peace and security; North/South Korean relations were even significantly improved with the first inter-Korean summit in June of that year. The stark contrast with the current relations with North Korea demonstrates the fluctuating, but ever present task of confronting North Korea nuclear threats. Solutions over how best to deal with North Korea have ranged from military intervention, United Nations Security Council sanctions, bilateral and multi-lateral negotiations, to stick-and-carrot offerings. The dialogue over North Korea's nuclear issue has reignited after each nuclear test or discovery and has often led to equating North Korean nuclear endeavors with the production of nuclear weapons.

Siegfried Hecker's[1] most recent visit to North Korea's Yongbyon site in November 2010 reignited controversies over the country's nuclear ambitions and nuclear weapons program. As one of the world's most demonized countries, North Korea's endeavors often occasion analysts' worst-case scenarios and the international community's stick-and-carrot treatment. Whether North Korea deserves this reputation is open to interpretation which will not be addressed in this paper. Perceptions regarding North Korea are problematic however, when they are derived from over-generalized assessments, intuitive leaps, and preconceived expectations. This paper seeks to articulate a more nuanced assessment of North Korea's current nuclear program by highlighting how common and problematic intuitive leaps create obstacles for an accurate evaluation of North Korea's nuclear capabilities and can harm future negotiations.

## II. The North Korean Nuclear Threat

There is no denial that North Korea's nuclear capabilities pose a threat to North East Asia's security. Because of the limited availability of knowledge on North Korea's nuclear program, there is debate over exactly what type of threat and how much of a threat their programs pose. The distinction between North Korea's capacity, capability, and completed construction of nuclear weapons becomes lost as discussions focus on the number of nuclear bombs that North Korea can produce; identifying these distinctions will be critical to defining points of friction or opportunities for negotiations.

### *History of North Korea's Nuclear Program*

The source of North Korea's nuclear threat has often been linked to the country's capabilities and intentions to produce nuclear weapons, and their past nuclear and missile tests. Although it is difficult to concretely identify North Korea's nuclear intentions, the country's past actions warrant concern over the current capacities for nuclear weapons development and proliferation.

North Korea's membership to the Nuclear Non-Proliferation Treaty (NPT), from 1985 through 2003, has been an opportunity for some international oversight over the country's nuclear programs. During this time, International Atomic Energy Agency (IAEA)[2] inspections have uncovered inconsistencies and attempted deceptions by North Korea that have increased suspicion that North Korea was diverting fissile material to develop nuclear weapons. In 1990, IAEA testing of North Korea's fuel rods for its 5Mwe gas-graphite reactor indicated the possibility or three different episodes of plutonium separation between 1989 and 1991, which contradicted North Korea's claim of a single episode of plutonium separation in 1990. One of the IAEA inspectors stated, "We had to approach [North Korea] harder and harder as they realized we were going to discover their wrongdoings."[3] During this period, according to IAEA officials, there was also evidence of North Korea attempting to hide or camouflage facilities of particular interest to the IAEA inspectors.[4] According to Oberdorfer, the North Korean "minister of atomic energy, Choi Hak Gun, told IAEA inspectors, 'Even if we had done it [cheated], we would never admit it.'"[5]

The IAEA's difficulty in accounting for North Korea's past nuclear history had furthered the speculation on possible attempts by North Korea to develop nuclear weapons. Such speculation was later in line with the country's nuclear weapons tests on October 9, 2006 and May 25, 2009. North Korea's, as Hecker describes, "limited and less-than-successful

[1] Siegfried Hecker served as director of Los Alamos Laboratory from 1986-1997 and is currently a Co-Director of the Center for International Security and Cooperation and Professor at Stanford University. Hecker has made several visits, in an unofficial capacity, to the North Korean nuclear complex.

[2] The IAEA is an independent international organization that works closely with the United Nations on several nuclear issues. The IAEA conducts inspections to verify that countries implement proper protocols and procedures as contained within the NPT.

[3] Don Oberdorfer, The Two Koreas. (Basic Books, 2001), 270-271.

[4] Ibid., 275.

[5] Ibid., 278.

nuclear test history," severely underwhelmed analysts worst-case-scenario estimates, however they did confirm observers expectations of the country's military nuclear ambitions.[6]

*Current Concerns*

Currently there is no IAEA oversight of North Korea's nuclear activities, as North Korea remains the only country to have withdrawn from the NPT. Any discussion of rejoining the NPT and IAEA inspections will likely be closely linked with Iran's obligations under the treaty. Iran is a current NPT member and claims to be developing a civilian nuclear energy program which has elicited international concern.[7] In addition, there are also concerns that North Korea may attempt to sell its nuclear technologies, fissile material, and/or its technical knowledge to countries and terrorists.

Given North Korea's past actions, it is understandable to react with suspicion and unease towards their most recent nuclear endeavors. However, if we view North Korea's actions in terms of the amount of bombs they can produce or the amount of technology and knowledge they are capable of proliferating, then overgeneralizations caused by fears can cause us to lose track of the more nuanced details. Such nuanced details will likely become obstacles to the resumption of six-party talks and bilateral negotiations or they can provide an opportunity for areas of mutual cooperation or at least international oversight on North Korea's nuclear activities.

**III. The Facts of North Korean Nuclear Facilities**

On November 12th, Siegfried Hecker, accompanied by John Lewis and Robert Carlin, traveled to the Yongbyon Nuclear Complex to observe North Korea's latest nuclear endeavors. Hecker's presents an objective analysis from his observations in his November 20, 2010 summary which will be briefly summarized below.[8]

Currently, North Korea is constructing an estimated 25-30MWe[9] Light Water Reactor (LWR)[10] which, according to North Korean officials, is a small prototype for a larger LWR to be built once the technology is mastered. A recently constructed uranium enrichment facility is reported to be operational and contain 2000 gas-centrifuges. These two facilities, according to Hecker, appear to be designed primarily for generating civilian nuclear power. As for previously known structures, the 5MWe gas-graphite reactor[11] appeared dormant but remained on stand-by mode while the 50MWe gas-graphite reactor continued to stand abandoned as a pile of iron and concrete.

Hecker provided a balanced and objective analysis of his findings by contrasting his views with possible outcomes. He expressed belief in North Korea's pursuit of nuclear electricity as genuine while balancing his assessments by citing the facility's capacity to amass a certain amount of weapons-grade nuclear material. In another example of Hecker's objective analysis, he noted that the 5MWe gas-graphite reactor is in stand-by mode, but could become operational within six months with reconstruction of the cooling tower. In addition, he compared the ease with which various facilities could be employed to produce fissile material while also comparing their civilian use capabilities.

**IV. Media Coverage on North Korean Developments**

Although some of Hecker's observations have been disseminated widely through recent commentary on North Korean nuclear developments, his objectivity and nuanced approach have largely failed to command the same attention. Following Hecker's most recent visit, a large portion of articles mentioned North Korea's uranium enrichment only when linked with fears of producing more bomb fuel. When media reports mentioned the North Korean stated goal of producing civilian power, it was often framed within the context of hiding more sinister ambitions.

In an article for Foreign Policy Magazine, Josh Rogin illustrates the popular view of North Korean initiatives as a cover for illicit activity:

> As tensions spiral upwards on the Korean peninsula, North Korea's construction of a light water nuclear reactor in addition to its new, sophisticated uranium enrichment facility, allows the regime to claim that its enrichment program is for domestic civilian power needs -- as [sic] the same argument that Iran makes -- according [to] the first Western scientist allowed to visit the facility.[12]

Many media reports have simply stopped mentioning the North Korea's stated pursuit of nuclear energy all together, and simply equated actions involving North Korean nuclear endeavors with the pursuit nuclear weapons.

The absence of any mention of dual-use technology and civilian nuclear endeavors invites unproven assumptions to become fact:

> With North Korea's choice to use centrifuges to enrich uranium to fuel its nuclear weapons, an axis of states that use the technology has now emerged with North Korea, Pakistan and Iran.[13]

[6] Siegfried S. Hecker, "Redefining denuclearization in North Korea," *Bulletin of the Atomic Scientists*. December 20.

[7] David Albright and Paul Brannan, "Taking Stock: North Korea's Uranium Enrichment Program." *The Institute for Science and International Security* (2010): 28.

[8] Siegfried S. Hecker, "A Return Trip to North Korea's Yongbyon Nuclear Complex," *Center for International Security and Cooperation of Stanford University* (2010).

[9] Megawatt of electricity (MWe): Measurement of electricity which is equivalent to 1000 watts of electricity.

[10] Light Water Reactors require low enriched uranium as fuel and use water as a moderator.

[11] Gas Graphite Reactors do not require enriched uranium, use natural uranium as a feed and use $CO_2$ or helium as a coolant, and graphite as a moderator.

[12] Josh Rogin, "Hecker: North Korea Now Has Same Nuclear Defense as Iran," *Foreign Policy Magazine* (2010)

[13] Christine Kim, "Getting a grip on the centrifuge subterfuge," *Korea JoongAng Daily,* November 23, 2010.

Countries with a stake in the protracted multinational efforts to denuclearize North Korea are crafting a concerted reaction, possibly including new sanctions, to the North's latest nuclear disclosure that it is equipping itself with another capability to produce nuclear weapons.[14]

With each new simplified equation captured by the popular discourse on North Korean endeavors, the public's and media's knee jerk reaction to North Korean activities becomes all the more solidified. With multi-lateral and bilateral discussions already "mired in distrust and accusations,"[15] achieving a consensus on North Korea's nuclear ambitions will likely be an obstacle in the pursuit of an overall agreement between the United States and North Korea.

## V. Discussion in Detail

It is possible that North Korea could use the current uranium enrichment facilities or have additional hidden facilities that produce highly enriched uranium that they are stockpiling to create nuclear weapons. The link between North Korea's current endeavors and stockpiling nuclear bombs has been greatly oversimplified, and in my opinion, is tenuous at best. To provide some clarity on the current debate, further clarification on North Korea's nuclear endeavors will be discussed.

### *Prior North Korean Claims*

Although many observers were taken by surprise on November 12, 2010 when the public learned about North Korea's efforts to build a light water reactor, North Korea had first announced its intentions in 2009 in response to UN sanctions. A North Korean spokesman issued a statement on April 29 that "the DPRK will make a decision to build a light water reactor power plant and start the technological development for ensuring self-production of nuclear fuel as its first process without delay."[16]

### *Siegfried Hecker's Reaction*

Prior to Hecker's latest visit to the Yongbyon Complex, he did not believe that North Korea could achieve this goal on a large scale. In "North Korea's Choice: Bombs over Electricity," co-authored by Hecker, he explains "we believe that North Korea is not technically prepared to enrich uranium beyond the laboratory scale or to build its own LWR."[17] In several articles, Hecker's reaction is coupled with the description of thousands of centrifuges to paint a scene for an impressive and ominous endeavor. Such ominous descriptions are typical when describing North Korean nuclear endeavors, yet such figures should be put into perspective.

### *Civilian and Military Uses of Nuclear Technology*

In current media reports, North Korea's recent construction of a prototype LWR and uranium enrichment facility has spurred fear of an increased capability for North Korea to acquire nuclear weapons. With nuclear enrichment facilities, it is relatively easy to transition from the production of low enriched uranium (LEU), which can be used to fuel nuclear reactors, to the production of highly enriched uranium (HEU), as used for the development of medical isotopes and nuclear weapons.[18] Concerns over increased capacity for nuclear weapons development derived from uranium enrichment have been focused predominantly on Iran and North Korea despite this quality being common to any country or company who engages in uranium enrichment. Using the same parts, highly enriched uranium can be achieved by rearranging the cascades (a specific arrangement of centrifuges) thus enabling the low enriched uranium to flow through a greater number of separation step.[19]

The ability to derive fissile material from dual-use technology, a trait common to all uranium enrichment facilities, has been so closely associated with North Korean endeavors that any pursuit of nuclear energy will likely face skepticism and alarm from the American perspective. The divergent perspectives between North Korean insistence on engaging in civilian nuclear power and the views of most analysts of North Korean ambition to increase its nuclear weapons capacity will likely provide considerable friction in present relations and future negotiations. Even outside of negotiations, North Korea's uranium enrichment facility has become a battleground of speculation over the presence of additional uranium sites, proliferation of enrichment knowledge, and other issues. Referring to U.S. initiatives against North Korea's enrichment facilities, chief non-proliferation advisor, Gary Samore, stated, "The U.S. and its allies are doing everything we can to try to make sure that we complicate matters for [North Korea]".[20] The dual-use characteristic common to all enrichment facilities has been forgotten or ignored when framed within the North Korean context.

### *Focus on Number of Centrifuges*

The number of centrifuges has often been used as evidence to demonstrate the alarming size of the North Korea's nuclear facilities. On its own, the number of centrifuges does not provide a clear overview of North Korea's enrichment capabilities, yet the described

[14] Moon Gwang-lip, "Possible New Sanctions for Uranium," *Korea JoonAng Daily*, November 23, 2010.
[15] Siegfried S. Hecker, "Lessons Learned from the North Korea Nuclear Crisis," *Daedalus.* (2010): 50-54.
[16] Siegfried S. Hecker, "The Risks of North Korea's Nuclear Restart," *Bulletin of the Atomic Scientists* (2009).
[17] Siegfried S. Hecker et al., "North Korea's Choice: Bombs over Electricity," *The Bridge*. Vol. 40, 2 (2010): 9.
[18] Houston G. Wood, Alexander Glaser, and R S. Kemp, "The Gas Centrifuge and Nuclear Weapons Proliferation," *Physics Today (2008)*: 42-43.
[19] Kenneth D. Kok, *Nuclear Engineering Handbook*, Mechanical Engineering Series. (CRC Press 2009), 273-275.
[20] David E. Sanger and William J. Broad, "U.S. Concludes N. Korea Has More Nuclear Sites," *The New York Times,* December 14, 2010.

number of centrifuges has taken on a meaning of its own to signify North Korean nuclear ambitions. Indeed it is typical for an enrichment facility to contain thousands of centrifuges.

One relevant concern regarding the number of centrifuges is how North Korea acquired these parts. Many analysts trace North Korean parts to elaborate procurement schemes through front companies engaged in smuggling.[21] Regardless of whether North Korea's nuclear enrichment parts came from international sources, as analysts suspect, or were developed indigenously, as stated by North Korean officials, extensive UN Security Council sanctions have not prevented North Korea's ability to develop its uranium enrichment program.

*Uranium Hexafluoride: A Possible Clue*

The number of North Korea's gas centrifuges has received the vast amount of attention, but a more important and less discussed issue is North Korea's ability to produce uranium hexafluoride, a feed material for its gas centrifuges during uranium enrichment.

According to Hecker, "Yongbyon had never admitted having made uranium hexafluoride previously because it is not required for gas-graphite reactor fuel. Yet, now they claim they have this capability on site; however I was not allowed to see it. Nevertheless, my hosts made the case that they have everything they need to run the centrifuge facility."[22]

Even if North Korea could produce Uranium hexafluoride, understanding the purity of the hexafluoride produced is critical to understanding North Korea's ability to feed large scale enrichment facilities. Uranium hexafluoride that fails to meet the purity requirements will corrode the barriers, the separating elements, of the gas centrifuges.[23] If North Korea is achieving less-than-ideal purity for its Uranium hexafluoride, then the current nuclear enrichment facilities would require extensive equipment maintenance and repair to the centrifuges making it costly to run large scale enrichment facilities and seem to contradict some previous claims of North Korea's proliferation activities. If North Korea is adept at producing uranium hexafluoride of optimal purity, it could give credence to the assessment that North Korea was seeking to supply Libya's nuclear facilities in the early 2000's.[24]

*Concerns over North Korea's LWR Construction*

Several media sources have voiced concerns that a light water reactor could be an opportunity for North Korea to produce weapons-grade plutonium. Given that light water reactors produce "reactor grade plutonium" rather than "weapons grade plutonium," it is a much less attractive means of obtaining plutonium for nuclear weapons.[25] Thus, it could be possible to produce a plutonium bomb, however spent LWR fuel is several steps away from this end and weapons grade plutonium could be acquired by North Korea by other more efficient means. As Hecker pointed out, if North Korea's goal was the production of plutonium, this could be achieved much more easily from the 5MWe gas-graphite reactor that is currently on standby.[26] The light water reactors were proposed in the Agreed Framework[27] specifically because they were formulated more towards the production of electricity than for bombs.

*Electric Power vs. Nuclear Weapons*

Despite the North Korea's statement of its nuclear energy pursuit and Siegfried Hecker's observations confirming this notion, much of the current dialogue has unequivocally focused on the opportunity for the production of fissile materials. After the Agreed framework was signed, the partially constructed 50MWe gas-graphite reactor (geared towards dual-use) and the 200MWe reactor (seemingly designed for electricity production) were dismantled. With the two promised 1,000MWe LWR failing to come into fruition, it is telling that even North Korea's construction of a 25-30MWe LWR is causing alarm over weapons creation.

Currently, Hecker points out, South Korea operates 20 light water reactors which provides nearly 40% of the country's electricity.[28] He also suggests that, in North Korea's case, "giving up the bomb and developing civilian nuclear power could help lift its economy and its people out of poverty."[29] Now that North Koreans could argue they are beginning down this path, U.S. fears have only increased due to the potential for proliferation and hidden facilities.

[21] David Albright and Paul Brannan, "Taking Stock: North Korea's Uranium Enrichment Program." *The Institute for Science and International Security* (2010): 2.

[22] Siegfried S. Hecker, "Redefining denuclearization in North Korea," *Bulletin of the Atomic Scientists*. December 20, 2010.

[23] Kenneth D. Kok, *Nuclear Engineering Handbook*, Mechanical Engineering Series. (CRC Press 2009), 270-271; David Albright and Paul Brannan, "Taking Stock: North Korea's Uranium Enrichment Program." *The Institute for Science and International Security* (2010): 8.

[24] Ibid., 9-10.

[25] U.S. Department of Energy, *Nonproliferation and Arms Control Assessment of Weapons-Usable Fissile Material Storage and Excess Plutonium Disposition Alternatives.* Office of Scientific and Technical Information. Department of Energy. (January 1997): 38.

[26] Siegfried S. Hecker, "A Return Trip to North Korea's Yongbyon Nuclear Complex," *Center for International Security and Cooperation of Stanford University* (2010): 6.

[27] The Agreed Framework was signed in 1994 between the United States and the Democratic People's Republic of Korea (North Korea) whereby North Korea would freeze its nuclear reactors and related facilities in exchange for more efficient nuclear energy technology and steps towards normalization of political and economic relations between the two countries.

[28] Siegfried S. Hecker, Sean C. Lee, and Chaim Braun, "North Korea's Choice: Bombs over Electricity," *The Bridge*. Vol. 40, 2 (2010): 9.

[29] Ibid., 10.

Speculation of Hidden Facilities

The revelation of hidden nuclear facilities in North Korea is a recurring theme in media coverage and in negotiations. Such concerns are legitimate however international actions on such certainties have come at a steep price. Don Oberdorfer, a Korea expert, described how North Korean negotiators in 1999 were able to use American concern over a possible nuclear facility for a nuclear weapons program at Kumchang-ni cavern to obtain 600,000 tons of UN food for access to the facility, which "was not a nuclear facility and was unsuitable for such purposes."[30] Regardless of whether there is agreement on Oberdorfer's interpretation of the Kimchang-ni negotiations, he highlights the risks associated with estimating the size and capabilities of North Korea's nuclear facilities. North Korea's capacity to produce and proliferate nuclear weapons combined with their past demonstration of nuclear tests and possession of weapons grade uranium spawn speculation and alarm over the existence of covert nuclear facilities and the stockpiling of more fissile material. Overestimation of the extent of North Korea's covert nuclear facilities risks providing North Korea with extra negotiating leverage and sending the IAEA and international intelligence analysts on a wild goose chase.

## VI. Reactions and Prospects of North Korea and the NPT

Concern over North Korea's ability to proliferate or produce nuclear weapons will always be a primary concern and indeed past missile tests and evidence of proliferation may legitimize these sentiments. It is absolutely essential, however, that our fears do not dictate the facts on which we base negotiations with North Korea. As Hecker describes lessons learned from the North Korean crisis, he observes, "In Washington, the threat was often exaggerated for political purposes. Hence it is important to get accurate, publically available technical assessments of nuclear capabilities."[31]

Currently progress in multi-lateral negotiations are stalled until North Korea takes visible steps to dismantle its nuclear program, relegating direct talks between the U.S. and North Korea to unofficial diplomatic missions.[32] The wide discrepancy over the perceived threats from North Korea regarding its proliferation of nuclear weapons, the possibility of additional enrichment facilities, and the capacity to divert uranium to increase its nuclear stockpile makes it difficult to pin down exactly what the steps towards might denuclearization consist of.

*The Limits of future IAEA Oversight and North Korean NPT Membership*

The resumption of IAEA inspections is a critical first step but not a solution to "resolving the North Korean nuclear issue." IAEA oversight can verify that North Korea is not converting their enrichment facilities to produce highly enriched uranium or diverting fissile material, however concerns regarding covert facilities, nuclear proliferation, and North Korea's pursuit will likely continue to plague the oversight process, as it has in the past. North Korea is not currently a NPT member state, the country announced its withdrawal 1993 and officially withdrew in 2003. However, even if the country returned to the NPT and accepted the safeguards, concern over dual-use nuclear technology and weapons proliferation will likely remain. Addressing such concerns requires looking beyond the scope of North Korea's nuclear program to address the scope IAEA oversight and the limitations of the NPT. The NPT upholds the "inalienable rights of all parties to the treaty to develop research, production and use of nuclear energy for peaceful purposes... in conformity with Articles I and II of this treaty" (Article IV of the NPT), however, North Korea violated Article II with its production and test of nuclear weapons. Given that North Korea is the only country to withdraw from the NPT, there is question of exactly what rights North Korea has under the NPT for nuclear energy production given previous treaty violations.

If North Korea were to rejoin the NPT, given that they are considered a non-nuclear weapons state, they would be required to submit to the Safeguards Agreement and confront the same issues as in the past. Michael Spies notes the limits of IAEA safeguards application in that "they do not address the circumstances where a state has diverted nuclear material using indigenous material and equipment, as was the case in North Korea."[33] According to Article XII.7 of the IAEA Statute, "In the event of non-compliance... [the Agency can] suspend or terminate assistance and withdraw any materials made available by the Agency or a member." Such actions would be irrelevant to North Korea who claims to use indigenous talent and equipment for their program or is able to acquire the material amidst United Nations Security Council (UNSC) sanctions.

If North Korea agreed to the Additional Protocols INFCIRC/540 this could assuage fears of possible clandestine nuclear facilities in North Korea because it would give the IAEA authority to investigate undeclared locations by carrying out "location-specific 'environmental sampling.'"[34] North Korea would be highly unlikely to approve such a drastic increase in IAEA oversight because the Additional Protocols also provides the IAEA with the right to access and require reporting on all activities throughout the entire nuclear fuel cycle from mining to production (Article 5.a). By requiring

[30] Don Oberdorfer, The Two Koreas. (Basic Books, 2001), 412.
[31] Siegfried S. Hecker, "Lessons Learned from the North Korea Nuclear Crisis," *Daedalus.* (2010): 50-54.
[32] Christopher Weber, "Bill Richardson Travels to North Korea on Unofficial Diplomatic Mission," Politics Daily. December 14, 2010.
[33] Michael Spies, "Iran and the Limits of the Nuclear Non-Proliferation Regime," *American University International Law Review* (2006): 419.
[34] Theodore Hirsch, The IAEA Additional Protocol What It Is and Why It Matters. *The Nonproliferation Review* Fall-Winter (2004): 144

North Korea to enable access to its production capabilities, North Korea would have to prove that it is indeed capable of manufacturing all the components for its nuclear facilities, as they had previously claimed, or risk losing face with evidence that North Korea did indeed import much of their equipment. Any discrepancy over claims of importing or exporting materials or the indigenous production of certain parts will likely invite further increase scrutiny of North Korea's endeavors. Compliance with additional protocols is viewed as a confidence building measure, not required but once signed is legally binding. Due to the increased IAEA scrutiny and the legal risks faced by North Korea rejoining the NPT and submitting to the Additional protocols, extensive and comprehensive IAEA inspections will likely take time to implement, and thus it is critical for the international community to achieve some current oversight through negotiations.

**VII. Recommendations**

Given the overall negative reception of Pyongyang's showcase of its progress in nuclear endeavors, much of the attention over relations with North Korea has narrowed in on denuclearization. Carlin and Lewis elucidate the key to success in past negotiations: "The negotiations themselves were stuck until the United States recognized the agreement would have to go beyond nonproliferation."[35] With the six-party talks stalled over the U.S. demand for North Korean to take steps towards denuclearization, any resulting negotiation would likely incorporate the sticks and carrots method to try and settle U.S. concerns about North Korea's nuclear threat. As Carlin and Lewis illustrate, this short term approach ignores North Korea's strategic needs. One of the most obvious needs, in light of North Korean claims and efforts, is the provision of energy. A second overall need that Carlin and Lewis describe is a "desire for a long-term, strategic relationship with the United States that."[36]

The inability for UNSC sanctions to prevent the development of North Korea's nuclear development demonstrates that North Korea could continue expanding its nuclear program. If the U.S. would like to influence the outcome of North Korean nuclear initiatives it would seem there is no choice but to engage in negotiations. Hecker proposed one basis for negotiation, in what he calls "the three no's – no more bombs, no better bombs, and no exports – in return for one yes: Washington's willingness to seriously address North Korea's fundamental insecurity along the lines of the joint communiqué."[37]

Given both North Korea's desire to develop its nuclear power infrastructure while ideally developing a long-term strategic relationship with the United States, the United States should respond by trying to play a role within North Korea's nuclear fuel cycle. One possible role could be engaging in a trade whereby the U.S. acquires North Korean spent fuel rods and then provides new fuel rods for North Korean LWR. Simply stated, the U.S. needs to develop a strategic partnership with North Korea in a manner that accommodates North Korea's efforts to achieve energy security, while providing acceptable oversight and control over opportunities for diversion of fissile material.

In the 1997 KEDO[38] reached a procurement agreement, in which it was to provide LWR fuel. This agreement obviated the need to develop uranium enrichment facilities in the DPRK and it contributed toward an easing of fears regarding the production of fissile material from uranium enrichment. If the Agreed Framework had gone through, under Article III.2 of the NPT, the provision of nuclear fuel would have enabled safeguard protocols and IAEA oversight of the proposed LWR even with North Korea's non-member NPT. Now that North Korea has demonstrated its commitment and ability to develop uranium enrichment facilities the United States must find a way to establish the oversight that is desperately needed.

Although U.S. acquisition of North Korean spent fuel rods is oriented towards back-end reprocessing as opposed to the KEDO agreement of front end orientation, both proposals represent an attempt to assuage fears about potential "cheating" by engaging in long-term partnerships. Now that North Korea is no longer part of the NPT, the U.S. should be trying to gain some insight into North Korean nuclear activity by becoming integrated into North Korea's nuclear cycle rather than further isolating North Korea.

[35] Robert Carlin and John W. Lewis, "Negotiating with North Korea: 1992-2007," Center for International Security and Cooperation of Stanford University. January (2008): 5.

[36] Robert Carlin and John W. Lewis, "Negotiating with North Korea: 1992-2007," Center for International Security and Cooperation of Stanford University. January (2008): 21.

[37] Siegfried S Hecker, "What I Found in North Korea," *Foreign Affairs*. December 9, 2010.

[38] KEDO is a consortium of countries including the United States, Japan, and South Korea developed in 1995 to provide funding and assistance for the implementation of the key parts of the Agreed Framework. Its responsibilities included the financing of the two Light Water Reactors.