



Scenarios for the Future of US-North Korean Relations Engagement, Containment, or Rollback?

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EXECUTIVE SUMMARY

This report is based on two workshops held at the Nautilus Institute over three days in May and June, 2002. These workshops brought together a group of experts to explore the uncertainties that North Korea faces and to begin a dialogue about effective strategies for United States engagement with North Korea.

The future of North Korea is particularly uncertain today given the following key issues:

- Shortly after the September 11 attack on the United States, US President George W. Bush labeled the nation as part of the "axis of evil." North Korea remains on the State Department list as a sponsor of terrorism.
- Increasing skepticism among US officials that North Korea will fulfill its obligations under the Agreed Framework led President Bush to refuse to certify that North Korea is under compliance of the agreement.
- Relations between North and South Korea remain on-again, off-again. The recent naval clash in the Yellow Sea threatened to derail efforts at engagement, but following North Korea's expression of regret, talks are set to resume on family reunions and economic cooperation.
- A planned visit to Pyongyang by US Assistant Secretary of State James Kelly was canceled after the

naval clash, but has now been revived following a meeting between US Secretary of State Colin Powell and DPRK Foreign Minister Paek Nam Sun at the ASEAN Regional Forum. The date and agenda have not been set, however.

- NK-Japan Red Cross talks resulted in an agreement by North Korea to “investigate” the status of Japanese that were allegedly abducted by NK agents. North Korea also agreed to expel four Japanese Red Army members who hijacked a plane to North Korea in the 1970s. Public opinion in Japan remains hostile to North Korea, however, especially following the sinking of a suspected NK spy ship.

At the same time, the future of North Korea is becoming increasingly important to the United States and other powers, not only because North Korea remains an impoverished nation, badly in need of humanitarian aid, but also for the following key reasons:

- US relations with North Korea are intimately tied with US relations with China, which are critical for global security.
- The US-DPRK Agreed Framework has global security and environmental implications throughout Asia and the rest of the world, as its failure could promote transfer of weapons of mass destruction to other nations or terrorist groups.
- It is highly unlikely that there will be peaceful unification on the Korea Peninsula without dramatic intervention by global players.

The Nautilus Institute has pursued cooperative engagement as an approach to addressing concerns in North Korea. It has supported several energy-related projects that provide assistance, knowledge, and hope for the nation – in an effort to raise the standard of living and encourage transparency and openness. As a part of the scenario process, we will explore whether a cooperative engagement approach will remain robust given multiple uncertainties.

Working with a group of experts on North Korea, we designed four scenarios that highlight the key questions about the future of North Korea. These are meant to assist us in thinking about possibilities for the future, rather than to predict precisely what will happen.

Gridlock

Gridlock is a dangerous world--a tension-filled nuclear powderkeg. The world moves toward a renewed Cold War situation as great powers eye each other warily and smaller countries seek shelter in alliances and weapons of mass destruction. As US-North Korean relations crumble in this scenario, North Korea grows closer to China while the US-South Korean alliance is strengthened. To enhance the US position in Asia even more, the United States and Japanese militaries become more aligned to the point that the United States shares nuclear forces with Japan. These relationships set

off a domino affect of nuclear proliferation in the region. At the same time, North Korea's control of its population slips as thousands of satellite phones enter the country, giving locals the ability to communicate with the outside world. By most accounts, North Korea is on the brink of a massive bust, bringing forth the specter of a failed state with nuclear weapons

Great Leader 3

A new leader emerges in North Korea. In this scenario, the global war on terrorism escalates to such a point that the United States pulls some of its troops from South Korea, leaving South Korea more vulnerable. The long-predicted Japanese financial collapse causes havoc in Asian and global markets, and nearly shuts off trade between the United States and Asia. South Korea is hit hard, as its GNP, which was formerly highly dependent on Japan, plummets virtually overnight. In an effort to restore its economy, support its manufacturing base, and open to the Asian continent, South Korea invests in large-scale infrastructure projects in North Korea. This opens the door for improved relations on the peninsula in the long-term, and to a South Korean tilt toward China as its alliance with the United States falls apart. North Korea endures.

Phoenix

This scenario begins with Bush declaring the Agreed Framework to be breached and gaining support to cut-off food supplies in North Korea. With a Democratic Congress and a second-term Republican President in the United States, US foreign policy has taken a turn toward greater multilateralism and a more cooperative attitude toward China. As the scenario progresses, North Korea implodes in rebellion and even more devastating famine, eventually bringing Chinese-led peacekeeping troops to the country. The boundaries between North and South Korea crumble, and reunified Korea is rebuilt with economic aid from the United States and other countries. Indeed, this is a scenario of destruction and revival, where far-sighted leaders work together to build a peaceful new peninsula out of the ashes of a collapsed North Korean regime.

Mujige—Rainbow

The title of mujige (Korean for "rainbow") was chosen because of the symbolic meaning of rainbows in both Western and Eastern culture. In the West, rainbows symbolize hope and redemption. In the East, rainbows are seen as bridges, and are a sign of friendship. This scenario is one of redemption and reconciliation between long-time enemies. The scenario begins with strained relations between North Korea and the United States causing a collapse of the Agreed Framework. Diplomatic talks between the two nations, though, lead the US to support economic reform and diplomatic

normalization in exchange for verification of past nuclear activity. As the United States supports World Bank loans to North Korea, China and Japan facilitate discussions between North and South Korea and the development of Special Economic Zones throughout North Korea. With cheap labor from North Korea becoming increasingly attractive to South Korean businesses, the barriers between the two Koreas starts to fall. As the North Korean people are touched by economic opportunities, new challenges emerge with petty crime, counterfitting, and labor issues mounting in this newly developing economy.

We then used these scenarios to wind-tunnel three possible approaches for US policy toward North Korea--rollback, militant containment, and cooperative engagement. Each of these postures is a hybrid which contains all three policies, but only one is pre-eminent.

- In all four scenarios, rollback failed, as the United States could not afford the risks of escalation, particularly given the uncertainty of the Chinese response. In one scenario, Phoenix, the ends of rollback were achieved as North Korea collapses, although through a combination of containment of North Korea and engagement of China.
- Containment had mixed success, preventing war in two scenarios, while failing to do so in the other two.
- In all four scenarios, cooperative engagement plays a positive role in terms of non-proliferation and stability, or at least mitigates the negative aspects of the scenario. Moreover, in none of the scenarios did cooperative engagement result in greater vulnerability for the United States.

The results of this exercise therefore suggest the need for strengthened efforts at cooperative engagement in the Korean Peninsula. These efforts should be carried out with a combination of government, non-government, and corporate support, and will require the participation of individuals and institutions from the United States, South Korea, China, Japan, and elsewhere. The multi-layered, complex problems of North Korea can only be solved with creativity, patience, and perseverance.

FOREWORD

The always on-again, off-again US engagement of North Korea[1] has been mostly “off” in recent months, particularly in the wake of the September 11 terrorist attacks. Although North Korea was not implicated in the attacks themselves, its listing by the State Department as a sponsor of terrorism and its reputation as a proliferator of weapons of mass destruction have left it on the wrong side of the Bush administration’s global war on terrorism, as President Bush signaled when he included North Korea as part of an “axis of evil” in his State of the Union address.

Current Situation regarding US - North Korea Relations

One of the key questions regarding the US-North Korea relationship is the future of the Agreed Framework, under which the Korean Peninsula Development Organization (KEDO) is building two 1-megawatt light water reactors (LWR) in North Korea. The LWR project has come under criticism since its inception as expensive, impractical, and a reward for bad behavior. Some critics have charged that, rather than putting an end to the North Korean nuclear program, the Agreed Framework will make it easier for North Korea to build nuclear weapons, by providing it with more plutonium and buying time for it to continue clandestine nuclear activities[2].

One of the provisions of the Agreed Framework states that after a significant portion of the LWR construction has been completed, but before the key nuclear components are delivered, North Korea must come into full compliance with IAEA safeguards, including giving a complete accounting of its past nuclear activities. Critics have argued that it would take three years for the IAEA to conduct a thorough forensic analysis of past North Korean nuclear activities, although cooperation from North Korea could shorten this time considerably. As the "significant portion" benchmark is currently scheduled for 2005, some observers believe that North Korea must allow the inspectors to begin their work within this year to keep the agreement on track. For this reason, the Bush Administration decided to not certify that North Korea is under compliance with the agreement, as required under an Act of Congress. They then exercised a provision in the Act allowing them to waive the certification on national security grounds, allowing the provision of heavy fuel oil to continue. One senior US official was quoted anonymously as warning that, should North Korea not allow the inspectors in by the end of the year, the US may consider the agreement to have been breached.

In April, South Korean President Kim Dae Jung sent his closest advisor, Lim Dong Won, to North Korea to try to break the deadlock. The results were positive, at least for the short run. North Korea agreed to hold another round of family reunions; to convene a meeting of the North-South Economic Cooperation Committee; to restart Red Cross talks with Japan on alleged kidnappings and food aid; and to allow US Special Envoy Jack Pritchard to visit Pyongyang. Whether this renewed dialogue will yield any concrete results remains to be seen, however. In particular, with new elections scheduled for December in South Korea, the future of South Korean engagement of North Korea is unclear. The impacts of the June 29th naval combat between the two Koreas will also damage the short term prospects for inter-Korean cooperation.

Nautilus Institute

Since 1993, the Nautilus Institute has been pursuing cooperative engagement projects with North Korea in an attempt to help lessen tensions on the Korean Peninsula and promote dialogue among the major players involved. These projects include:

- **The Northeast Asian Peace and Security Network**

(NAPSNet)[<http://www/nautilus.org/napsnet/dr/index.html>], which provides daily news summaries and analysis of the major issues affecting peace in the region. NAPSNet is the only outside source of news accessible in Pyongyang.

- **The US-North Korea Village Windpower Pilot Project**

[<http://www/nautilus.org/dprkrenew/index.html>], which constructed seven wind turbines and a water-lifting windmill in Unhari village on the North Korean west coast. This project has also brought three delegations of North Korean engineers to study tours of the US, and conducted the first rural household energy use survey in North Korea.

- **The East Asian Energy Futures Project**

[<http://www.nautilus.org/energy/eaef/futures.html>], which brings together leading energy specialists from throughout Northeast Asia to analyze the current policies and possible future paths for energy policies of each individual country and the region as a whole.

- **The Northeast Asian Grid Interconnection Project**

[<http://www.nautilus.org/energy/grid/gridindex.html>], which is examining the potential for connecting the electric power grids of the countries in the region. Such a connection could provide a solution to the inability of the North Korean power grid to safely support operation of the two KEDO light-water reactors.

These projects have all been premised on the idea that cooperative engagement is a necessary basis for promoting peace and reconciliation on the Korean Peninsula. Events, however, could arguably move in a direction that render this approach ineffectual. Therefore, it is necessary to test, or "wind-tunnel," various strategies to see whether they remain viable despite the uncertainties of the future.

Scenarios Methodology

To test the viability of cooperative engagement strategies, the Nautilus Institute uses scenario methodology. Scenario planning is a non-predictive means of examining a variety of possible futures for the issues that one is interested in. Once a number of scenarios are developed, they are examined to determine which strategies are robust among all different futures. In this way, one can avoid being thrown off course by sudden, unanticipated shocks.

In order to examine whether a continued policy of NGO-level cooperative engagement with North Korea is viable, the Nautilus Institute convened a workshop on Future Scenarios for US-North Korea relations at the Institute's offices in Berkeley on April 30 and May 1, 2002. The workshop examined the focal question "What will North Korea's relations with the United States look like in 2012?" This was followed by a second workshop on June 24 to test strategies using these scenarios.

PARTICIPANTS

Experts from the San Francisco Bay Area and Washington DC alongside Nautilus staff members participated in this workshop. To ensure that a variety of perspectives were represented, participants were drawn from government, academia, research institutions, and the private sector. Some had long experience working on Korean issues. Others were relative newcomers to Korea. All offered great depth of insight in one or more areas that informed the richness of the two scenarios. The full list of participants is provided in Attachment 2. We thank them all for their dedication over the events. We also thank the HKH and Ford Foundations for their financial support for the use of scenarios methods to reduce global insecurity.

1. NORTH KOREA FUTURES—US POLICY CHOICES FOR THE NEXT DECADE

North Korea remains the "black hole" of Northeast Asia. Its continuing isolation, famine, and economic collapse not only constitute a humanitarian crisis, but act as a barrier to improving cooperation and engagement in Northeast Asia on a number of fronts--political, economic, military, security, and energy. The continued hostility and tension on the Korean Peninsula essentially render South Korea an island and perpetuate Cold War divisions that have all but dissipated in other parts of the world. If the key to security is not simply preventing war, but building peace, true peace in Northeast Asia will remain impossible unless and until the question of Korean division is addressed.

In this workshop, we focused on US-North Korea relations as the primary lever for change on the Korean Peninsula. The United States holds the key to North Korean engagement with the outside world. South Korea, Japan, China, international financial institutions, and the European Union all have important roles to play in promoting reconstruction and development in North Korea, but it is unlikely that any of these groups will bear the burden without US acquiescence or support. US troop presence and overall security strategy in the region are both affected by and determinant of the peace and security situation on the Korean Peninsula.

The scenarios offer several insights for promoting a peaceful resolution on the Korean Peninsula.

1) The Agreed Framework Is Key

In all of the scenarios, the outcome of the Agreed Framework played a crucial role in determining how events unfolded. In one scenario, the successful implementation of the agreement paved the way for North Korean opening and cooperation. In others, the breakdown of the agreement led to

conflict. This suggests that the Agreed Framework is a fragile policy instrument, but at the same time remains the primary underpinning of US engagement of North Korea. While it may need fixing or replacement with a more viable alternative, abandoning the Agreed Framework will make peaceful resolution impossible.

2) China-US Relations are Crucial

In all scenarios, the state of US relations with China was a key factor. When the US and China cooperate, the possibility for a peaceful solution increases. When the US and China are in conflict, peace on the Korean Peninsula becomes very difficult. This suggests that anyone interested in promoting peace on the Korean Peninsula should actively engage China whenever possible.

3) Near-Term Peaceful Korean Reunification is Unlikely

Only one of the scenarios resulted in Korean reunification within 10 years, and that took place only following the violent implosion of North Korea. This suggests that the policy of eschewing reunification issues while concentrating on reconciliation is robust. Cooperation with North Korea should be based on the assumption of the continued existence of North Korea for an indefinite period of time, and not be focused on the "endgame" of Korean reunification.

2. THE SCENARIOS

A scenario is a tool for ordering one's perceptions about alternative future environments in which today's decisions might play out. In practice, scenarios resemble a set of stories built around carefully constructed plots. Stories can express multiple perspectives on complex events and give multiple meaning to these events.

Good scenarios are plausible and surprising. Despite its story-like qualities, scenario planning follows systematic and recognizable phases. The process is highly interactive, intense, and imaginative. Scenarios are powerful planning tools precisely because the future is unpredictable. Unlike traditional forecasting or market research, scenarios present alternative images instead of extrapolating current trends from the present.

Successful scenarios begin and end with clarifying the decisions and actions the participants must make if they are to successfully deal with an uncertain future. One common misconception of scenarios is that they are prescient, path dependent predictions of the future. On the contrary, scenarios are used to order our thoughts amid uncertainty, build common ground among differing

perspectives, and think rationally about our options - but they should never divert attention away from the decision itself.

2.1 Critical Uncertainties

Participants were broken into two teams and asked to develop a set of “critical uncertainties”—issues whose outcome is both undetermined and vital for the development of US-NK relations over the next ten years.

Two groups of participants began by creating a list of top 40-50 forces that they believe will influence the future of US-NK relations in 2012

. They were requested to consider specifically the role of the four great powers in the region; social, political, economic and military factors; and positive, negative, or simply neutral forces (the complete list generated is shown in Attachment 1). The groups were then asked to sort their driving forces into those forces that were predictable and those that were highly uncertain. The latter highly uncertain forces were then “voted” into the most potent categories. Facilitators then distilled this array into nine issues that were judged by the group as likely to generate the greatest uncertainty and drive events on the Peninsula. Table 1 presents this short list.

Table 1: Critical Driving Forces for Korean Futures

1. NK political, economic, social and cultural dimensions; food shortages; political transition.
2. NK military strategy.
3. NK-SK relationship.
4. Agreed Framework: nuclear weapons transparency issues, future of KEDO, LWR construction project etc.
5. Two US presidential elections.
6. Global war on terrorism.
7. Geopolitical developments affecting the Korean Peninsula.
8. US foreign policy.

2.2 The Scenarios Matrix

To examine how these uncertainties might develop over the next ten years, two uncertainties were

chosen and plotted on two axes to create four separate quadrants. One axis was whether relations between North and South Korea would move in the direction of cooperation and rapprochement or towards conflict. This axis explored various elements of the relationship between North and South Korea including political, military, and economic relations. The other was whether the international situation surrounding the Korean Peninsula will be one of cooperation or confrontation. This axis explored how various nations including the US, China, Japan, and others relate with each other, as they affect the Korean Peninsula. These two driving uncertainties became the ‘scaffolding’ around which the analysts worked in small groups to create four scenario stories [see Figure 1]:

Gridlock

Phoenix

Great Leader 3

Mujige-Rainbow

Each story was framed by one of the four possible paired combinations of the two critical uncertainties. The group was then divided into four groups of four, with each group assigned to develop one scenario. Each group named their scenario and then prepared a succinct presentation showing how their scenario came about and sought to convince others that their imagined world is plausible, important, and internally consistent. They created 10 headlines that encapsulated the key events and decision points in each scenario narrative. They were asked to return to their scenarios to ensure that their narratives reflected the political, economic, social and strategic-security interests of each great power (including the European Union). Each group then attempted to incorporate answers to the following key questions in their scenario:

Table 2: Key Outcome Questions For Scenarios

What are the biggest political, economic, social, and military challenges for the US government?

What are the biggest political, economic, social and military opportunities?

What is the state of Korean Re-unification?

What is the status of North Korea’s economic recovery?

What is the overall economic and security situation in Northeast Asia?

The result was four distinct scenarios that describe the full array of uncertainties that will affect the future evolution of US-NK relations.



The following narratives describe each scenario in detail.

2.3 Gridlock (N-S Confrontation, Great Power Confrontation)

Gridlock is a dangerous world--a tension-filled nuclear powderkeg. The world moves toward a renewed Cold War situation as great powers eye each other warily and smaller countries seek shelter in alliances and weapons of mass destruction. As US - NK relations crumble, North Korea grows closer to China while the US-SK alliance is strengthened. To enhance the US position in Asia even more, the United States and Japanese militaries become more aligned - which is how some people think Japan gained nuclear capacity. This sets off a domino affect of nuclear proliferation in the region. At the same time, NK control of its population is slipping as thousands of satellite phones enter the country, giving locals the ability to communicate with the outside world. By most accounts, North Korea is on the brink of a massive bust, bringing forth the specter of a failed state with nuclear weapons. The primary US strategy in this scenario is containment via nuclear deterrence.

The downward spiral begins in 2003, when Taiwan declares its independence, and the US 7th fleet moves into the Straits to prevent a Chinese military response. Checked in its main arena of concern, an angry China decides to open a second front by encouraging a more belligerent stance by North Korea. With widespread fear of war gripping the American public, George W. Bush easily wins re-election in 2004 in a campaign that emphasizes hawkish views on foreign policy, carrying even such bastions of liberalism as Marin County. Bolstered by assurances of Chinese support, North Korea refuses to allow IAEA inspectors to examine its suspect facilities, and the United States declares in 2005 that the Agreed Framework is officially dead. North Korea immediately withdraws from the NPT, and the Conference on Disarmament dissolves amid angry shouting between the US and Chinese delegates.

Kim Jong Il promptly boards a train to Beijing for a "Friendship Summit" with Chinese President Jiang Zemin. Photographs of the two allies shaking hands in Tiananmen Square as they announce a renewed military alliance make the front page of newspapers worldwide. Washington begins to squeeze China in multilateral institutions, until Beijing finally walks out of the Doha round in 2006. "Buy American" and "Buy Chinese" signs sprout like crabgrass in the two countries as both sides impose high tariffs on each other's products. The following year, North Korea conducts a missile test that lands offshore of Kobe, leading to widespread panic and anti-Korean riots in Japan. Within months, the Japanese government carries out a nuclear test and declares itself a nuclear power. Europeans push for sanctions against Japan, but US refusal to go along causes a domino affect of withdrawals from the Non-Proliferation Treaty, culminating with US Secretary of State John Bolton's announcement that the treaty is "no longer relevant to the current situation." Summit diplomacy produces yet another shock, as Japanese Prime Minister Ichiro Ozawa stands proudly next to President Bush in the Rose Garden while they announce the integration of their nuclear forces.

Panicked at being left behind by its ally and threatened by its former overlord, South Korea in 2008

announces that it has produced a home-grown nuclear weapons capability. Donald Rumsfeld angrily denies rumors of US involvement in the SK nuclear program, but welcomes SK forces into the US nuclear alliance. New technology introduced by Exxon-Mobil in 2009 reveals an abundance of offshore oil reserves in the Pacific, leading to an orgy of land-grabbing as Japan seizes Sakhalin, China takes the Spratlys, and South Korea places a missile launcher on Tokdo. In 2010, an explosion rocks the Youngwong reactors in South Korea, leading to a deadly radioactive cloud covering large parts of Japan and sparking massive protests. In 2011, NK soldiers returning from joint military excises with China in Southeast Asia bring a rapidly spreading AIDS epidemic that North Korea's dilapidated health system is powerless to deal with, and the government's control over the population diminishes like that of European principalities during the Great Plague. In 2012, SK newspapers report that North Koreans have gained access to thousands of smuggled satellite phone-linked tiny PDA's and to the internet via cell phones that connect with network nodes in South Korea and China, which is posing a tremendous challenge for the secretive, nuclear-armed NK government. Many analysts fear that China will soon step in to either prop up the current NK regime or replace it with a more viable, Beijing-oriented group.

Figure 2 shows headlines from the Gridlock scenario.



2.4 Great Leader 3

Great Leader 3

A new leader emerges in North Korea. The global war on terrorism has escalated to such a point that the United States has pulled some of its troops from South Korea, leaving South Korea more vulnerable than before. The long-predicted Japanese financial collapse causes havoc in Asian and global markets, and nearly shuts off trade between the United States and Asia. South Korea is hit hard, as its GNP, which was formerly highly dependent on Japan, plummets virtually overnight. In an effort to restore its economy, South Korea invests in large-scale infrastructure projects in North Korea, to support its manufacturing base and open to the Asian continent. This opens the door for improved relations on the peninsula in the long-term, and to a South Korean tilt toward China as its alliance with the United States falls apart. US strategy in this scenario contains elements of rollback, as the United States tries to back up its policy with force, usually with unwanted results.

The world is shocked in 2003 when a new "Great Leader III", a member of the Kim family, makes the dramatic announcement that Great Leader II, Kim Jong Il, was already dead. Rumors are that he expired in a train wreck on his way to Russia in 2001. Not wishing to suffer his predecessor's fate, GL3 promptly boards an Aeroflot flight to Moscow, returning with an agreement to export labor to the Russian Far East and exchange NK raw materials such as gold and magnesium for Russian oil. Seeing an opportunity, SK companies invest heavily in refurbishing NK mines and railways, reaping large profits as a result.

Hopes for renewed prosperity in Northeast Asia are dashed, however, when on January 2, 2004, the Japanese stock market reopens after the holiday only to suffer a crash of proportions that the world had not seen since 1929. By the time the New York Stock Exchange opens, chaos has already overtaken world markets. With the combination of global security threats related to the US war on terrorism and economic threats, there's a massive closing-in, as the United States raises trade walls, greatly reducing trade between Asia and the United States. "Made in China" disappears from store shelves as US trade with China plunges. US Commerce Secretary Newt Gingrich tells the WTO that "the US will no longer tolerate dumping of cheap goods onto its markets by the Red Chinese." Unable to rely on the depressed Japanese market, SK money is poured into North Korea in an effort to seek economic gain and military security, and to pave the groundwork toward reunification. SK conglomerates focus on self-serving infrastructure projects such as building power plants to provide electricity to their industrial outlets.

In 2005, the United States expands the war on terrorism into central Asia, pushing more Islamic militants to take refuge in Western China. An unknown entity attacks the natural gas pipeline between Russia and China--China places the blame squarely on Washington. SK banks, which had invested heavily in the pipeline, take the hardest hit, and labor unions take to the streets as GNP drops 20% in South Korea.

In 2006, a chemical-biological cocktail is delivered to Yongsan base in Seoul via an aircraft hijacked from Beijing International Airport. 100,000 Koreans and 2,000 GI's are killed, and the US denounces the lack of security in the Beijing airport. SK GNP drops another 20%, unemployment rises 40%, and crime and violence rule the streets of Seoul. The US blames the attack on North Korea and tries to impose sanctions in the UN Security Council, but China vetoes the proposals. In retaliation, the US seizes an NK merchant export ship, accusing it of transporting WMD materials. An NK Foreign Ministry spokesman denounces the move as "a reckless attempt by the US imperialists to stifle our nation," and calls off scheduled IAEA inspections. IAEA Director Hans Blix issues a warning that North Korea cannot be considered a member in good standing of the NPT. President Bush invites Taiwan President Chen to Washington, where the two sign an agreement to extend Theatre Missile Defense to Taiwan. The New York Times describes China's missile buildup in Fujian Province as "ominous."

Declaring an impasse on the nuclear issue in 2008, the US bombs the KEDO LWRs and NK missile sites. An angry SK President Roh Moo-hyun denounces US "arrogance" and sends a crew of SK engineers to help repair the bombed reactor and connect it to the SK power grid over the DMZ. White House spokesman Ari Fleischer says that the US will "continue to honor its security commitment to South Korea," but most analysts agree that the relationship is in trouble. CNN in 2009 broadcasts scenes of SK students dancing in the streets at news of North Korea's successful missile test over Japan. In 2010, amid a deepening world recession, a radical Islamic junta takes power in Jakarta as Indonesian government forces are routed by separatists in Aceh, Irian Jaya, Bali, and other provinces. The junta begins to arm a group of Islamic pirates--dubbed by George Will the "neo-Barbaryans" to link them with the 19th century Islamic pirates of the Barbary Coast--who shut down the Malacca Straits, putting Japan's energy supply in a virtual straitjacket. The Jakarta junta begins running guns to Muslim guerrillas in the Southern Philippines. Helpless to crush the rebellion, President Arroyo turns to the US for help, and Secretary of Defense Donald Rumsfeld announces that the US will redeploy the 2nd Infantry Division from SK. With the US having now

alienated its last supporter in South Korea, the military, President Roh announces the cancellation of the F-X fighter project, prompting laid off Boeing workers to vandalize Korean grocery stores throughout Washington State. Roh announces that all remaining US troops should leave the country within three months, and that he was nationalizing US military property in South Korea; Washington recalls its Ambassador from Seoul in protest. With the Taiwanese economy already reeling under the weight of years of pressure, China begins to enforce a "no-go zone" in the Taiwan Straits, cutting off any shipping to the island. The "Arirang Spirit" joint N-S military exercises in 2011 spawn anti-Korean riots throughout Japan. In response, the two Koreas begin seizing Japanese fishing vessels in the East Sea, while students in Seoul and Pyongyang burn maps that contain the words "Sea of Japan." After a joint N-S naval patrol sinks a Japanese Marine Self-Defense Forces patrol vessel, oil tanker sea-lanes in the Tsushima Straits are shut down. A Chinese Foreign Ministry spokesman denounces US 7th fleet maneuvers off Taiwan as "blatant interference with China's internal affairs," to which the US retorts, "We are simply protecting a sovereign, democratic nation against the aggressive designs of a Communist dictatorship." In 2012, a US Congressional investigation reveals that the ICBM tested a few months earlier by South Korea was developed using blueprints that the US sold to South Korea in 1975 and jet engine technology transferred by Lockheed Corporation in the same year. Given the growing military closeness between the two Koreas and China, fears of technology transfer are widespread.

Figure 3 shows the headlines from the GL3 scenario.



2.5 Phoenix

This scenario begins with Bush declaring the Agreed Framework to be breached and gaining support to cut off food supplies to North Korea. With a Democratic Congress and a second-term Republican President in the United States, US foreign policy though, has taken a turn toward greater multilateralism and a more cooperative attitude toward China. As the scenario progresses, North Korea implodes in rebellion and even more devastating famine, eventually bringing Chinese-led peacekeeping troops to the country. The boundaries between North and South Korea crumble, and reunified Korea is rebuilt with economic aid from the United States and other countries. Indeed, this is a scenario of destruction and revival, where far-sighted statespersons work together to build a peaceful new peninsula out of the ashes of a collapsed North Korean regime. US policy in this scenario is one of containment, but in a multilateral context.

In this scenario, a shift in the US political landscape and Dick Cheney's health problems lead George W. Bush to name Colin Powell as his running mate in the 2004 election. When the results of this election return a Democratic Congress and a second-term Republican President, US foreign policy takes a turn toward greater multilateralism and a more cooperative attitude toward China, supported by corporate interests who donated large sums to both Democratic and Republican campaigns.

Despite this growing Sino-American rapprochement, hardliners in the North Korean military refuse to allow IAEA inspectors to examine suspect activity in North Korea. This escalates conflict between the United States and North Korea, leading President Bush to declare that the Agreed Framework has been officially breached and that "all options are being considered in response." Hoping to avoid a conflagration, Chinese President Hu Jintao makes an emergency trip to Washington and prevails on Bush to refrain from military action. As part of the deal, Hu agrees that China will not veto sanctions on North Korea introduced in the UN Security Council and will step up efforts to halt NK missile exports. In 2007, reports of food aid diversion from the people of North Korea to the military lead to a suspension of all food aid to North Korea. This isolates North Korea even more, with its Ambassador to the UN Li Gun angrily denouncing the UN as a "sycophantic tool of the American imperialists" and withdrawing the delegation.

With tensions in the Middle East greatly reduced following a 2008 pact establishing Palestinian statehood and providing Israel with security guarantees, NK missile sales are affectively ended, causing a sharp fall in North Korea's primary source of foreign currency earnings. Reports filter out of the country of mass starvation even among the army in North Korea. In January 2009, NK refugees in China report rumors of the death of Kim Jong Il, which are finally confirmed when his eldest son, Kim Jong Nam, appears on NK television to announce his elevation to leadership. He is never seen publicly again. SK media quote intelligence officials as saying that Kim has been killed and that competing army factions are fighting for control of the country.

Refugees talk of localized populist rebellions, with farmers joining soldiers to conduct raids on food distribution centers. By August, with the refugee problem threatening to explode, China imposes martial law in Yanbian and arrests several SK missionaries, accusing them of being SK intelligent agents and of running guns into North Korea. As pressure grows in South Korea and within the US Congress for intervention in this increasingly desperate country, the United States and China hold a summit in January, 2010 and agree to take the matter to the UN Security Council. The UNSC authorizes the dispatch of an international peacekeeping force, led by China but also including Swedish, Irish, Malaysian, and Cambodian troops, to establish UNIANK, the United Nations Interim Administration for North Korea. While a few hard-line elements of the NK military take to the mountains in an attempt to carry out a guerilla resistance, most gladly lay down their arms and take up the proffered alms. Some North Koreans head toward the DMZ, begging for food from SK soldiers, who oblige as best they can. SK civilian groups come to the front to provide aid and succor, followed quickly by people seeking long-lost relatives. With all the activity and exchange on the DMZ, pretty soon it is impossible to separate the Northerners from the Southerners, and what's more, no one is trying.

A small group of NK elites who had been hiding among the crowds of food seekers now reveal themselves and call for an "all-Korean unity meeting" at Kaesong. After just three days, they emerge and announce the establishment of the new unified Korea with the capital at Kaesong, and call for international aid for the rehabilitation of the northern part of the country. In 2011, the International Conference on Korea is held in Tokyo, at which the US, China, Japan, Russia, and the EU agree to recognize the new Korean government and pledge US\$20 billion in aid for Korean reconstruction. Japan and the US agree to provide the bulk of the capital, while Russia and China agree to open their markets to facilitate the enterprise. In 2012, China and Korea sign a \$3 billion hydropower contract, despite protests from Korean and international environmentalists.

Figure 4 shows the headlines of the Phoenix scenario.



2.6 Mujige (Rainbow)

The title of mujige (Korean for "rainbow") was chosen because of the symbolic meaning of rainbows in both Western and Eastern culture. In the West, rainbows symbolize hope and redemption. In the East, rainbows are seen as bridges, and are a sign of friendship. This scenario is one of redemption and reconciliation between long-time enemies. The scenario begins with strained relations between North Korea and the United States causing a collapse of the Agreed Framework. Diplomatic talks between the two nations, though, lead the US to support economic reform and diplomatic normalization in exchange for verification of past nuclear activity. As the United States supports World Bank loans to North Korea, China and Japan facilitate discussions between North and South Korea and the development of Special Economic Zones throughout North Korea. With cheap labor from North Korea becoming increasingly attractive to SK businesses, the border between the two Koreas starts to fall. As the NK people are touched by economic opportunities, new challenges emerge with petty crime, counter-fitting, and labor issues mounting in this newly developing economy. US policy in this scenario strongly favors engagement.

The scenario starts with a decline in US-NK relations, as the Bush Administration continues to demonstrate antipathy towards the Agreed Framework. Throughout the remainder of the administration, the United States and North Korea fail to make progress in their relations, with occasional moves toward dialogue inevitably derailed in a flurry of heated rhetoric and accusations. As the US economy continues to stall, President Bush loses his re-election bid in 2004. Shortly afterward, Bush announces that North Korea has failed to comply with the Agreed Framework and that all heavy oil shipments would henceforth cease. Calling the move "a blatant betrayal," North Korea announces that it was retracting its suspension of withdrawal from the NPT and would officially leave the pact on February 1, 2005.

As the time for his inauguration draws near, President-Elect John Kerry convenes a meeting of his senior advisors and some of the country's leading Korean experts. Fearful of a military crisis in the first month of his administration, Kerry announces at his inauguration that he is willing to talk with North Korea to solve the differences over the nuclear program. He swiftly dispatches former President Bill Clinton as a special envoy to Pyongyang. Clinton returns with an agreement that North Korea will turn over the necessary documents to verify its past nuclear activities to the IAEA, while the United States will remove North Korea from the list of states sponsoring terrorism and begin the process of diplomatic normalization.

With US support, North Korea negotiates loans from the World Bank, IMF, and ADB for the refurbishment of its infrastructure. China and Japan begin sending developmental aid delegations to North Korea. NK leader Kim Jong Il opens the new inter-Korean railroad tie by taking a train from Pyongyang to Seoul for a summit meeting with SK President Roh Moo-hyun. At the press conference afterwards, the two announce that they would fully implement their commitments under the 1992

Non-Aggression Agreement and the Non-Nuclear Declaration of the same year, with mutual inspections and other confidence-building measures to prevent cheating. They also announce the creation of a Special Economic Zone in Kaesong, with Roh predicting that the SEZ would do for inter-Korean relations what Shenzhen did for the relationship between Mainland China and Hong Kong. Kim also agrees to accept the "continued temporary" stay of US Forces in South Korea in exchange for negative security assurances from Washington. Most analysts feel that Kim's decision was based on a desire to counter possible pressure from Japan, Russia, or China.

With the DMZ finally beginning to live up to its name as "demilitarized," food and other goods begin flowing across the border into North Korea. The average North Korean finds his lot in life improving dramatically, but still greatly behind that of his southern brethren. The NK elite, meanwhile, is cashing in on the new arrangement, contracting with SK firms to provide cheap labor for manufacturing. Allegations of corruption are widespread, and some NK party leaders are already billionaires from selling real estate north of the DMZ and running globally integrated trading, investment and financing corporations. Guest worker programs are running at an all-time high with more than two million North Koreans entering South Korea. The SK government has imposed stringent controls on the labor movement, which tries to block wage cutbacks due to the supply of cheap northern labor. American firms are also under fire at home from human rights groups due to their sweatshop operations in North Korea in joint ventures with SK chaebol.

Figure 5 shows the headlines of the Mujige Scenario.



2.7 Implications

Having developed the scenarios, we then went back and looked at how the key questions identified in Table 2 would play out in each of them.

Gridlock

The challenges for the United States in gridlock are similar to those at the height of the Cold War. The United States must handle the crises that arise with states like China and North Korea because of the ever-present danger that any military clash could escalate to a nuclear war. Economically, the US is shut off from the China market and must carefully manage trade relations with its allies. The scenario allows for greater military integration among US allies in Northeast Asia, possibly opening the way for the development of a NATO-like security structure in the region involving South Korea, Japan, the Philippines, Australia, and others. At the same time, the proliferation of nuclear weapons balances the burden-sharing of defense costs among the allies, reducing the cost to Washington of maintaining these alliances. Korean reunification remains an elusive goal; the possibility that an NK collapse will lead to absorption by the South remains open, but China is unlikely to tolerate a pro-US

Korean government on its border, and is thus likely to intervene. North Korea's economic situation has worsened even further and is in a critical state. The overall situation in Northeast Asia is one of competing trade and military blocs.

GL3

In GL3, the US is grappling with military overextension and the collapse of its traditional alliance with South Korea. It must deal with random, sudden cataclysmic events, a global war on terrorism, and the ever-present possibility that the ongoing struggle with China over Taiwan will escalate to full-scale war. Many of the constraints on US action vis-à-vis China and North Korea have been lifted, as Washington no longer has to consult with Seoul on policy toward North Korea or defer to China's position on Taiwan. The two Koreas are increasingly integrated militarily, but it is a rocky marriage of convenience as neither side is willing to give up its position or ideology for the sake of political reunion. North Korea is beginning to improve economically due to the influx of SK investment. Overall, the economy of Northeast Asia is depressed, although many nations are resorting to military Keynesianism to try to revitalize their economies. Military tension is high between Japan and the two Koreas and between the United States and China.

Phoenix

In Phoenix, the United States must overcome domestic political pressure for stronger action against North Korea and embrace unilateralist principles to make its containment policy work. It also must work closely with China to prevent events from spiraling out of control. The main opportunity for Washington is the chance to push events in a direction that fits US interests, and to achieve a reunified Korea that is friendly to the United States. Korea ends up reunified at the end of this scenario. North Korea's economy has completely collapsed, but by the end of the scenario the international community is pouring in money to rehabilitate the country. Overall, by the end of the scenario, tensions in the region are greatly reduced and the economy is growing as aid and investment pours into Korea and the region becomes increasingly integrated.

Rainbow

In Rainbow, the biggest challenge for the United States is building domestic political consensus around engagement. Economically, the US may end up bearing much of the costs of aiding DPRK development. The US has an excellent opportunity to reduce the threat from North Korea through peaceful means and to reduce tensions with China. Korea is not yet reunified, but reconciliation has made major strides in bridging the differences between the two halves of the peninsula. North

Korea is beginning to recover economically through foreign aid and investment. The overall situation in Northeast Asia is one of political cooperation and economic growth.

Table 3 summarizes these findings.

	Gridlock	GL3	Phoenix	Rainbow
US Challenges	Danger of war Reduction of markets	Overextension War with China	Domestic politics Cooperation with China	Domestic politics Costs of engagement
US Opportunities	Stronger alliances More burden-sharing	Freedom of action	Promotion of US interests	Reduction of threats
Korean Reunification	No; possibility of NK collapse	Marriage of convenience	Reunified	Reconciliation
NK Economy	Collapsed	Improving	Collapse followed by rebuilding	Improving
NEA Situation	Cold War	Economic depression & military tension	Cooperation & growth	Cooperation & growth

Table 3: Implications of Scenarios

3. Wind-Tunneling the Strategies

These four divergent scenarios are not meant to be either predictive or exclusive. The future likely will contain elements of each scenario as well as driving forces and events not imagined in this process. Nonetheless, these four scenarios can help us to anticipate the changes and challenges that we will face in the future.

With this caveat in mind, we held a follow-up workshop on June 24, 2002, to test the viability of the three major strains in US foreign policy--rollback, containment, and engagement--in the various scenarios. We then examined how those policy options would affect different stakeholders--the US, China, South Korea, NGOs, and corporations.

Participants in this workshop included representatives from government, NGOs, journalism, and academia. A complete list is included in the attachment.

The second workshop tested three overarching US strategies for dealing with North Korea (see Table 4).

US Posture	Strategic Goal	Historical Example	Hybrid Ranking of Instrument	Main Instrument
1. Rollback	Compellance	Expansion of Korean War by MacArthur	1,2,3	Military Force
2. Militant Containment	Deterrence	Cold War in Korea	2,3,1	Threat of Military Force
3. Cooperative Engagement	Reassurance	Agreed Framework	3,2,1	Diplomacy and Inducement

Table 4: Hybrid Strategies

Each strategy is a hybrid that contains elements of the other two, but only one element leads. It should be noted that the other two elements either buttress or sometimes conflict with the primary element. Strategy can never be reduced to just one of these orientations.

With this in mind, teams tested each of the hybrid strategies for performance in each of the four scenarios. They sought both the relative efficacy of the different elements and hybrid strategies on the one hand and specific steps that might be taken to deflect a scenario narrative toward a stable and non-proliferation outcome on the other.

3.1 Rollback

The term "rollback" refers to the policy of dealing with a hostile country by attempting to force that country to change its ways, even up to forcing a regime change. Rollback relies heavily on military power to accomplish its end, which is *compellance* of an adversary. Rollback was arguably the dominant paradigm for US policy toward the Korean Peninsula from 1948 until 1953, when the Korean War Armistice Agreement was signed.

The underlying motivations for rollback of North Korea are:

- Preventing WMD proliferation, including to terrorists;
- Destroying a regime that is considered despicable;
- Fulfilling the ideological goals of anti-communism; and

- Propagating core US values, including market economics.

Proponents of rollback hold the following assumptions about the outside world:

- Engagement doesn't work due to the intransigence of North Korea;
- The international system is chaotic, and therefore one cannot rely on international law to keep the peace;
- Unilateralism is the best approach for achieving foreign policy goals;
- Military force can be effective for promoting political ends;
- Certain states have aggressive intentions that can only be met with force;
- The United States is powerful enough to impose its will on its adversaries.

With these goals and assumptions in mind, the group then proceeded to examine what tactics a proponent of rollback would advocate in each given scenario, and the likelihood of their success.

Gridlock

In gridlock, rollbackers would be faced with two major constraints: China's strong support of North Korea, and the fear of the NK nuclear weapons capacity. To counter the former, the US might attempt a military buildup of conventional forces to overwhelm any Chinese intervention in Korea. It might also seek to open other fronts by supporting Chinese rivals such as Taiwan, Vietnam, or India. The United States might cultivate an alliance with Russia to help check Chinese ambitions. It could also impose an economic embargo on both China and North Korea. Covert operations to topple the NK government might be attempted. Washington could also seek to delegitimize the NK government by supporting a government in exile, pressuring allies to withdraw their recognition of Pyongyang, and refusing to accept North Korea as a legitimate dialogue partner in international organizations.

This strategy has little chance of success in this world. As long as China is supporting North Korea, US attempts at pressure are likely to have little effect on the latter's viability. The danger of escalation is extremely high in this scenario, as both North Korea and China will possess nuclear weapons, and US allies such as South Korea and Japan will be reluctant to go along knowing that they're on the front-line of nuclear terror. The threat of nuclear war will spark domestic opposition in those two countries, and eventually in an American public that will tire of the high costs as a resolution remains remote.

In GL3, rollback is tried but ultimately fails, primarily due to the opposition of South Korea. Indeed, the disagreement over rollback is a large reason for the break in the US-South Korea alliance. The United States is unable to compel North Korea to change without a pro-American government in South Korea to play the role of absorber. The United States is also stretched thin and cannot commit the necessary resources to make rollback effective. The danger of escalation is slightly less than in Gridlock, as there are fewer nuclear weapons in play, but the possibility of nuclear war with China remains high. Although the public is likely to support a hawkish strategy at the outset due to fear of a violent world, the continuation of conflict with little hope of resolution and the high costs involved will eventually spawn a vigorous peace movement.

Phoenix

Phoenix does accomplish the main goals of rollback: the elimination of North Korea and its replacement with a unified Korea friendly to the United States and pursuing market economics. However, the methods used to gain this are not rollback methods, but a combination of containment of North Korea and engagement of China. Indeed, rollback would be likely to drive China into strengthening its support for North Korea, thus undermining a golden opportunity to accomplish US goals without expending American blood and treasure.

The costs of rollback in this scenario would be significantly higher than containment, and would have to be borne unilaterally, whereas containment could be done with international support. The United States would also have to bear significant costs in intervening in North Korea, whereas by working with China, those costs are instead transferred onto the international peacekeeping force. With North Korea freed from the constraints of the NPT, the danger of nuclear escalation resulting from rollback would be high, and the possibility that China would intervene could not be discounted. Domestic opposition to rollback would likely be strong given the viability of cheaper, less dangerous alternatives.

Rainbow

There is no viable role for rollback in this scenario. When the crisis breaks in 2004-5, a US decision to choose rollback over engagement would block any possibility of peaceful resolution. It would encounter strong opposition from South Korea, China, and possibly even Japan. The rollback option would be significantly more expensive than cooperative engagement, which would be largely financed by South Korea, Japan, and international financial institutions. The danger of escalation would be somewhat less than in Gridlock or GL3, but China's reaction would be uncertain.

As can be seen in the above analysis, rollback is most likely to succeed when North Korea is weak and lacks external support, particularly from China. The United States must have South Korean

support to make rollback work. Direct provocations from North Korea would be more likely to gain domestic support for rollback, and it would have to be pursued outside the context of the United Nations Security Council.

The United States is most likely to be influenced to pursue a policy of rollback if a future SK government shows support for such a policy. Evidence of NK links to international terrorism or increased aggressiveness could drive the US towards rollback. Signs of North Korea weakening or Chinese disengagement would strengthen the rollback argument within policy debates. The most likely methods for persuading Washington to avoid rollback are pressure from South Korea, warnings from China of the possible consequences, and domestic political pressure from groups opposed to war, including corporations with an interest in regional stability.

Among stakeholders, NGOs have a great deal to lose if the US were to pursue a policy of rollback. Unable to continue dialogue with North Korea, many NGOs would be relegated to opposing US policy. Rollback would be a mixed bag for multinational corporations; defense industry groups would thrive, while those companies with heavy investments in China or whose profits depend on regional stability could suffer greatly.

South Korea would be greatly endangered by the likelihood that rollback would lead to a second Korean War, and economically by the reduced inflow of foreign investment and the loss of its trade with China. China would be pushed to strengthen its military and to bolster the NK regime to counter US rollback attempts. The right in Japan would likely be highly supportive of rollback, as it would likely result in an increased role for the Japanese military, as well as the benefits of US military spending in the region. Ethnic tensions with Korean-Japanese would likely be high. Russia would find itself threatened both by the remilitarization of Japan and the increase of China's military power, and its hold on the Far Eastern provinces would become increasingly tenuous.

3.2 Containment

Militant containment of North Korea has been the dominant US policy current from 1953 until today. The goals of containment are to maintain stability by strong deterrence and to manage occasional crises to prevent unwanted escalation of the military situation. Built into containment is the understanding that if deterrence fails, the result will be to switch to a maximal rollback strategy. Containment is a kind of coercive diplomacy that primarily relies on military force and nuclear threat. Diplomacy is used to manage allies and to isolate the adversary. The primary aim of containment is *deterrence*: dissuading the adversary from taking actions detrimental to yourself.

Containment as policy results from a policy struggle between regional specialists--who usually favor specific solutions to specific problems--and non-proliferation experts--who tend to look for the general application of non-proliferation rules--within the foreign policy establishment. At the same time that this struggle over tactics is going on, there is a general consensus on the goals and values

that US foreign policy is trying to promote. The result is a sort of "half-way" compromise between rollback and engagement. Containment is also predicated on the belief that the US is the only remaining superpower, and thus that unilateralism is an effective strategy, especially regarding the war on terrorism. "Routine containment" is viable in part because the American public remains largely ignorant of North Korea, and pays attention to the country only during a crisis.

Containment of North Korea is built on the assumption that China will use North Korea against the United States, but Washington will not be able to play Pyongyang off against Beijing. It assumes that great powers can manage Korean crises, but that regional powers will oppose US military action against North Korea. It requires that the US economy is not collapsing, so that the United States can continue to spend several billions of dollars isolating North Korea. It also is built on the premise that, September 11 notwithstanding, conflict remains primarily between states.

When containment was applied in the four scenarios, the following results occurred:

Gridlock

In gridlock, the US might consider re-deploying nuclear weapons to South Korea

to prevent Seoul (and by extension, Tokyo) from pursuing an independent nuclear capability. Containment advocates will likely try to re-invigorate international cooperation on arms control/disarmament of nuclear weapons states, and develop new agendas to replace the moribund NPT. They will also seek to revive regional cooperation on Korean issues.

In this scenario, the nuclear non-proliferation aspect of containment fails. Crisis management takes over, and stability is successfully achieved through mutually assured destruction. Rollback is off the agenda, as the risk of nuclear escalation is far too great. Containment continues to be an expensive proposition, and domestic opposition from anti-nuclear groups is high.

Great Leader 3

The fate of containment in GL3 is almost the exact opposite of Gridlock, as deterrence fails with the WMD attack on Seoul, but nuclear non-proliferation is successful. In the long-run, however, fears of nuclear proliferation in the two Koreas remain. Rollback is attempted in this scenario but fails. South Korea's shift to the Chinese sphere brings about the possibility of a new Cold War, with containment likely to continue as the dominant policy current.

To prevent the failure of non-proliferation goals, containment advocates might try sending an

emissary such as former US President Jimmy Carter back to Pyongyang to negotiate a new agreement. The United States and South Korea could push Japan to remain in KEDO. Airport security in Asia could be tightened to prevent the WMD attack on Seoul.

Phoenix

In Phoenix, the main difficulties for containment advocates are stopping North Korea from reviving its pullout of the NPT and preventing the implosion of North Korea. The former may be difficult to stop without North Korean cooperation. In the latter case, instead of further isolating the country, the United States might consider increasing food aid to fend off an implosion.

Containment tactics in Phoenix fail to prevent nuclear proliferation or to maintain regional stability. Ultimately, however, cooperative engagement with China saves the day.

Rainbow

In Rainbow, containment is subordinated to cooperative engagement. The main role of containment in this scenario is crisis management, to prevent North Korea from pulling out of the Agreed Framework. This requires shifting tactics in more of a cooperative engagement direction; such things as sending an envoy to Pyongyang earlier than envisioned in the scenario; revising the Agreed Framework, especially the heavy fuel oil deliveries; and cooperating with China on NK development.

Deterrence is successful in this scenario in bringing both sides back from the brink of war. This also gives South Korea confidence to engage North Korea more readily. Ultimately, however, cooperative engagement is needed to resolve the standoff.

Containment is thus robust on three scenarios in maintaining nuclear stability, and in two in preventing nuclear proliferation. In no scenario is it successful in achieving all its goals, except when supplemented by cooperative engagement.

3.3 Cooperative Engagement

US cooperative engagement toward North Korea has been carried out in a limited or partial manner since 1994, mostly through the Agreed Framework. The goal of this policy is to promote peace and stability through persuading the adversary to change his behavior, and to persuade allies and friends to help bear the cost. Cooperative engagement uses incentives and norms, not coercion, as its

primary tool. It leads with diplomacy to engage the adversary, to reassure allies, and to spread the cost.

The underlying motivations for the United States to pursue cooperative engagement of North Korea are to reduce or eliminate the threat of WMD attack and proliferation from North Korea. It seeks to build a safer, less contentious world in East Asia, and to draw North Korea into the world community, thus "giving them something to lose." Ultimately, cooperative engagement seeks, if not an outright regime change, at least a change in policy within North Korea. It also seeks to promote regional peace by engaging China to work together with the United States on the common problem of North Korea.

The underlying assumptions behind cooperative engagement are that governments will prefer when possible to use less violent means to achieve their objectives; that governments can agree based on mutuality of interests, and can be trusted to keep those agreements; and that US-China confrontation can be avoided through wise diplomacy.

In the first three scenarios, one primary tactic used by proponents of cooperative engagement would be to work with China to mitigate the negative effects of the scenarios.

In gridlock, to head off the threat of nuclear proliferation, the United States might provide guarantees of strategic support to both Japan and South Korea. To prevent the breakdown of the NPT, they might offer more incentives to North Korea to comply with IAEA inspections. These tactics could be successful in keeping the US allies in check vis-à-vis nuclear proliferation, thus avoiding the nuclear powderkeg envisioned in the scenario. They could also help to de-link the Chinese situation from the NK crisis, so that China does not reinforce the hardline behavior of North Korea. If North Korea is indeed using the inspections issue as a bargaining tool, then these tactics could succeed in ensuring that the inspections resume.

In GL3, the United States can head off the breakdown of its alliance with South Korea by engaging the new NK leader. It can also seek collective responses to global and regional economic problems, to prevent the emergence of competing blocs. Ultimately, cooperative engagement stands a better chance of success in this scenario than rollback, which fails, and containment, which has only mixed success.

In Phoenix, cooperative engagement with China is the key to preventing the situation in North Korea from blowing up. When the implosion does come, the United States can activate previously operating modes of cooperative engagement to help rebuild the country, including by cultivating those factions within the North Korean polity that are more inclined to work with Washington.

Rainbow requires strong government-to-government engagement to make it succeed. The main focus of this engagement should be the rebuilding of North Korean infrastructure. Ultimately, engagement in this scenario is successful in bringing North Korea into the international community and greatly reducing tensions on the Korean Peninsula.

Engagement is most successful when it is practiced within a well-defined scope, without trying to do too much. The lack of a Cold War environment of confrontation makes cooperative engagement more viable. Good personal relations between leaders and a favorable economic environment also provide a good basis for successful engagement.

Engagement is robust in the sense that it is helpful across all scenarios in at least mitigating the danger of conflict, even if it is not universally effective in achieving all its goals. It is efficient in all cases, being significantly cheaper than the other alternatives. It is domestically sustainable given the right message, leadership, and returns on the policy. It does not increase the risk of escalation, as it avoids provocative actions, except possibly with China over influencing North Korea. The main consequence of failure is that North Korea might be able to build WMD weapons undetected, but that danger can be greatly reduced through strong detection regimes, whereas such regimes are impossible without cooperative engagement.

The United States might be impelled to pursue engagement by humanizing North Korea through increasing contacts and education of the American public. Continued communication of the status of ongoing efforts, such as the disposition of nuclear materials, can help to reassure skeptics of the efficacy of this approach. Proponents of engagement can stress where North Korea has kept its agreements, and communicate with policymakers on these issues. Conversely, opponents of engagement can push the United States away from this course by demonizing North Korea, promoting unilateralism or isolationism, and stressing evidence of NK bad faith in implementing existing agreements.

Cooperative engagement creates a good environment for more effective NGO activity on NK issues. NGO's will be able to take a larger role, such as influencing policymakers and the public. NGO resources and media contacts can be used to help get the message of cooperative engagement out.

Regarding multinational cooperations, weapons manufacturers may suffer somewhat given the reduced justification for high US military spending, particularly on missile defense, but engagement would spur overall investment in North Korea, as well as likely in Northeast Asia as a whole. Industries that build infrastructure would have more business, especially those in South Korea.

China would gain from cooperative engagement as its role in world politics in partnership with the United States would increase. It would need to reassess what it considers to be an acceptable American role on the Korean Peninsula in the light of the new realities. Cooperative engagement opens up the possibility of resource sharing between China, South Korea, the Russian Far East, and

possibly even Japan.

SK proponents of the "sunshine policy" would see that policy affirmed by US engagement of North Korea. It would allow more social and economic interaction with North Korea, which, while widely desired, opens up the possibility of cross-DMZ social problems such as export of jobs, human smuggling, etc.

Of all the strategies tested in this exercise, cooperative engagement holds out the most promise for long-term positive benefits. Rollback is far too dangerous a strategy, given the uncertainty of China's response and the presence of nuclear weapons in the region. Containment has some viability, but it cannot accomplish all its aims without incorporating some elements of cooperative engagement. Engagement is also the least costly strategy; to date cooperative engagement of North Korea has cost the United States about \$0.1 billion per year, or 1-2% of the direct cost of maintaining containment through the US Forces in Korea. The cheapness of cooperative engagement makes it much more likely to be politically sustainable, both in the United States and among its allies, especially if concrete results can be shown.

At the same time, the fact that the Agreed Framework fails in three out of the four scenarios demonstrates that not all forms of cooperative engagement have an equal chance of success. The main danger of engagement, as its critics frequently point out, is that it may allow North Korea to continue to pursue a clandestine WMD capability while reaping the benefits of engagement. This danger can be mitigated through intelligent application of engagement in ways that are least susceptible to abuse and most easily verified. The danger of cheating also has to be weighed against the opportunity cost of losing a chance to prevent proliferation. As long as an agreement does not increase the vulnerability of the US and its allies, there is little to lose and potentially much to gain by attempting an engagement approach.

4. Conclusions

This exercise has demonstrated the true complexity of the situation on the Korean Peninsula. For over 50 years, the ongoing division has defied a simple solution, and will likely continue to do so for the foreseeable future.

Although the scenarios that we developed are not predictions of the future, they do provide a roadmap for how things might unfold. Particularly interesting is to look at how it is possible to transition from one scenario to another.

GL3 easily becomes Gridlock if the US decides to abandon nonproliferation norms in favor of closer ties with its Northeast Asian allies or if it pushes North Korea to move in this direction instead of engaging. The United States can also move more strongly to guarantee the Agreed Framework

despite Japan's financial collapse, which would help to reassure South Korea and thus prevent the break over policy between Washington and Seoul. If this tactic is applied earlier and more aggressively, it is possible to save the Agreed Framework and thus move toward a Rainbow scenario.

It is notable that Gridlock has a good chance of moving into Phoenix near the end of the period, when North Korea is sliding toward collapse. Doing so requires a breakthrough in rapprochement between the US and China, to prevent China from responding to North Korea's troubles by intervening to install a pro-Beijing government.

There is no real chance for Phoenix to transition to Rainbow, although the two scenarios ultimately have similar endpoints. Phoenix posits NK unwillingness to engage and a resulting collapse, both of which are inimical to the Rainbow narrative.

Knowing this helps us to evaluate future developments on the Korean Peninsula. If we look for signs that we are moving toward one or another scenario, we can better make judgments about which strategies will help us to accomplish the goals of peace and reconciliation. The choices are stark and real. The only question that remains is: will we make the choices or will the outcomes be imposed upon us?

APPENDIX 1: COMPLETE LIST OF DRIVING FORCES IN SCENARIOS

The following uncertainties were identified:

- Nuclear?
 - weapons
 - US missile defense
 - NK usage, moratorium expiration
 - Power
 - KEDO in 2010?
- NK capacity for nuclear?
- Politics in China?
- Weather, drought, famine?
- Water security?

- Political leadership in NK?
- Confucian
- Warlordism
- Political coup
- NK-US relationship?
- Trust
- Containment vs. engagement
- Understanding
- 2004 US presidential election?
- Japanese nationalism & constitutional revision?
- General attitudes on nuke power?
- Civil society in SK?
- Role of NGO's?
- Engagement vs. containment
- Empowerment
- Labor issues?
- chaebol/private sector efforts
- NK stance on harboring terrorists?
- Development of IT ?
- Econ reforms?
- Military coup?
- Political transition in NK?
- Military action outside of NK?
- US WMD?
- War declared?
- Expansion of internet access?
- Govt policy on IT?
- Regionalism/internal antagonisms?
- Food shortages continues?
- Political transition in N, South Korea?

- Economic model—China? Isolation?
- US policy on proliferation?
- US, S. Korean military alliance?
- US war on terrorism?
- UN role?
- Nuclear war?

-Pakistan, India

-India, China

-China, US

-Spratly Islands

-Tokdo

- US Isolation?
- US Troops redeployed from S. Korea?
- Global climate change?
- 'Axis of evil' effect on China?
- Chinese economic collapse?
- US-China relations are driving force?
- Renewable energy?
- Renewable energy cooperation?
- Information flood?
- Asian cultural alliance?
- Demographics?
- Agricultural reform?

-Food surplus/supply

-Technological change in food production

- Democratization?
- Change in leadership?
- State failure?
- Korea as platform for US-China tensions?
- South Korea's political agenda?
- Oil discovery?
- Curing major diseases?

- Outcome of nuclear inspections?
- Generational change in US?
- Graphite rises in value/use/world need?
- Control graphite regime?
- Pest control technologies become in great global demand?
- Global virtual casino?
- North Korea-Taiwan alliance?
- Biological agent release in NK?
- NK clones first humans?
- NK basketball wins gold medal?
- SK provides NK security guarantee?
- SK & US provide security shield?
- NK provides SK security shield?
- Natural disaster?
- Russian reversion?
- Political change in China?
- Political change in Japan: rising militarism?
- US returns to isolationism?
- US-SK alliance changes/breaks?
- South Asia proliferates nuclear weapons?
- US presidential elections?
- Acid rain/climate change devastates forests, crops?
- SK economy rise or fall?
- Global economy rise or fall?
- NK tests nuclear weapon?
- NK continues missile tests?
- Peace park/biodiversity corridors?
- NK sells real estate options on the DMZ?
- SK nuclear power/proliferation?
- Japanese financial meltdown?
- Rise in oil prices?
- Middle-East war?
- China-Taiwan conflict?
- China-Taiwan resolved?
- Missile defense countermeasures by NK & allies?

- NK trades mines for missiles?
- Major launch site/space commerce in China?
- N-S Korean satellite is launched?
- Joint N-S peacekeeping force deployed?
- LWRs completed but create new issues?
- Reactor in Japan 3 mile island?
- IAEA fails to certify NK nuclear past?
- IAEA certifies NK nuclear past?
- Russia gets involved in LWR?
- Resolution on defectors?
- Refugees increase, channels choked, focus on China?
- Sudden unification?
- New state emerges?

-confederation

-dictatorship

-democracy w/ US ties

- Immigration in China?
- Japanese economic situation?
- SK and Japan collaborate?
- NK collapse a la East Germany?
- US diplomatic approach?
- Infrastructure?
- Internet?
- N-S war?
- Trade investment?
- Kim Jong Il?
- SK political situation?
- EU develops independent policy?
- Transfer of nukes to terrorist networks?
- Dirty bomb?
- NK Hollywood?
- Weapons breakthrough renders military balance change?
- Kimchee bomb?

- Military clash (N or S) w/Japan (oil tanker, islands, fishing boats) renders alliance?
- Oil tanker accident on N-S coasts?
- Grass roots resistance to regime?
- Evolution of human desire for freedom?
- Become major labor exporter?
- Major narcotics exporter?
- NK withdraws from DMZ?
- Increased pressure for US involvement?
- US media changes viewpoint?

APPENDIX 2: WORKSHOP PARTICIPANTS

First Workshop, April 30-May 1

- Faruq Achikzad, a Defense and Energy Economist at EPRI, based in Palo Alto, California. Dr. Achikzad spent three years in Pyongyang as the resident representative of the United Nations Development Programme.
- Cho Byung-hae, Deputy Consul-General for the Republic of Korea in San Francisco. Prior to assuming his current post, Mr. Cho worked at the American Affairs Bureau in the ROK Foreign Ministry.
- Laurel Cotton, from the security division of the US Department of Energy's Oakland office.
- David Dixon, an energy economist at the US Department of Energy. Prior to joining DOE, Dr. Dixon worked for Combustion Engineering, and visited South Korea on business on several occasions.
- James Dixon, a businessman and former President of Cellular One and Nextel Corporation.
- Taewhan Han, Professor at the Intercultural Institute of California, and an expert on US-Korean relations.
- Robert J. Meyers of Hoover Institute at Stanford University. Dr. Myers previously worked for the Central Intelligence Agency in East Asia, and during World War II worked with members of the Korean independence movement as a member of the Office of Strategic Services operating in the China theatre.
- Richard Moon, management consultant and president of the Listening Institute.
- Daniel Pinkston, Senior Researcher at the Center for Nonproliferation Studies at the Monterey Institute of International Studies. Dr. Pinkston had worked for US military intelligence in South Korea, and holds a Ph.D. in International Relations.

- Daniel Rheinheimer, an intern at the Oakland office of the US Department of Energy. Mr. Rheinheimer graduated from the Univ. of Massachusetts Amherst with a BS in Civil/Environmental Engineering.
- Carol Yamasaki, Director of the Bosnia & Herzegovina project for the Whalen Family Trust, an expert in conflict resolution.
- Sandy Buffett, Nautilus Senior Program Officer. Ms. Buffett heads the Institute's corporate governance initiative.
- Jin Chen, Information Systems, Nautilus Institute
- Peter Hayes, Executive Director. Dr. Hayes has over 20 years experience working on nuclear weapons, energy, and security issues on the Korean Peninsula.
- Timothy Savage, Senior Program Officer. Mr. Savage has studied Korean history and language and coordinates the Institute's programs related to Northeast Asia.
- Brandon Yu, Program Officer. Mr. Yu, a graduate of the University of California, Berkeley, runs the Northeast Asian Peace & Security Network and coordinates institute outreach activities, and speaks Chinese.

2nd Workshop: June 24

- Faruq Achikzad, Researcher, Intercap Investments Inc.
- Zulfiqar Ahmad, Senior Program Officer for South Asia, Nautilus Institute
- Guy Arrigoni, Senior Analyst, Defense Intelligence Agency
- Jin Chen, Information Systems, Nautilus Institute
- Cho Byung-Jae, Deputy Consul-General, Consulate General of the Republic of Korea
- Joan Diamond, Chief Operating Officer, Nautilus Institute
- Deborah Gordon, Assistant Director, Institute For International Studies
- Peter Hayes, Executive Director, Nautilus Institute
- Randy Ireson, American Friends Service Committee
- Joyce Kallgren, Institute of East Asian Studies, University of California, Berkeley
- Hans Kristensen, Senior Program Officer for Nuclear Issues, Nautilus Institute
- Brian Kux, Foreign Affairs Analyst, US Department of State
- George Lewinski, Producer, Pacific Times, KQED Radio
- Timothy Savage, Senior Program Officer for Northeast Asia, Nautilus Institute
- Orville Schell, Dean, Graduate School of Journalism
- Jim Williams, Senior Associate, Nautilus Institute

- David Von Hippel, Senior Research Associate, Nautilus Institute
- Joel Wit, Center for Strategic and International Studies

Both workshops were facilitated by Doug Randall, an independent consultant on scenarios methodology, with the assistance of Nautilus Chief Operating Officer Joan Diamond.

Appendix 3: Energy Engagement Through a Scenario Planning Lens

The Nautilus Institute has worked extensively on energy engagement in North Korea, and what follows is a review of some of our work through a scenario planning lens. The NK energy shortage is a complex, multidimensional crisis that has a direct impact on the security, economic, and environmental situation in Northeast Asia. The Institute's quantitative energy modeling of DPRK energy paths offered the possibility of testing the plausibility of the DPRK scenarios against what is judged to be physically and economically possible. The following section discusses the robustness of continuing to engage the DPRK on energy issues.

The key result is that in Rainbow—the most optimistic scenario—the best energy outcome that is physically possible is recovery to 1990 levels of energy use and therefore a DPRK economy that is still tiny, backward, and substantially agricultural. This energy path implies that the scenario would require a very high rate of development in low-energy intensity sectors led by ROK corporate investment—for example, high value minerals, creation of a knowledge industry (software contract work), a vibrant film industry, eco-tourism, niche agriculture (mushrooms, medicinal plants), etc. It is not plausible, even in the best world, that the DPRK could become a Singapore or a Hong Kong. Panama, not Monaco, seems an apt benchmark.

In Phoenix, the DPRK energy economy is eliminated by warfare, and then refurbished in a unified Korea, presumably with substantial external assistance. We did not simulate this outcome in our quantitative modeling, but it is not difficult to visualize. Given the military forces in place in and outside of Korea, this scenario is all too plausible.

In Gridlock, the DPRK energy economy continues to stay trapped in its low-level equilibrium. It is certainly conceivable and highly plausible that this slow decline of the DPRK energy economy can continue so long as the political and social controls remain effective. Famine is all too likely to revisit provincial cities and outlying rural areas if the energy economy is any indication.

In GL3, the DPRK energy economy slowly recovers, but barely to 1990 levels. The implication of

continued energy decline is that the DPRK economy continues to be technologically stagnant. Thus, end use efficiency hasn't increased much because the integration with the ROK is still relatively minimal. The DPRK uses a lot of energy on a per capita basis in this scenario, but most of it is wasted in terms of welfare and productivity.

Energy Engagement of the DPRK—Is it Robust?

Energy cooperation is central to the US-DPRK Agreed Framework. Under the Agreed Framework, the United States has undertaken to provide two 1 gigawatt light water reactors to the DPRK and, until the first reactor is built, half a million tonnes of heavy fuel oil per year. In return, the DPRK has put its domestic nuclear fuel cycle and nuclear weapons program on freeze.[3] Much other cooperation between the DPRK and external parties has revolved around energy, including provision of oil and fertilizer by China and the ROK, and technical assistance to the power sector by the Russian Federation. Non-governmental organizations, including Nautilus Institute, have provided renewable energy technology for humanitarian needs in the DPRK.[4] The completion of the two light water reactors in the DPRK requires that either the ROK and DPRK grids are unified by about 2010, or that the Russian Far Eastern and/or Chinese grids are linked to the light water reactors and/or the ROK grid.[5]

Drawing on Nautilus' separate indicative energy path forecasts from 2000-2010-2020 for the DPRK (see Attachment 3 for detail), Nautilus analysts reviewed the consistency of each of the simulated energy pathways with the four future scenarios for the DPRK. These three energy pathways are:

Drawing on Nautilus' separate indicative energy path forecasts from 2000-2010-2020 for the DPRK (see Attachment 3 for detail), Nautilus analysts reviewed the consistency of each of the simulated energy pathways with the four future scenarios for the DPRK. These three energy pathways are:

Continued decline of the DPRK energy sector relative to its 1990 "high tide:" In the "Continued decline" path, overall fuels demand rises gradually after 2000 to about 56 percent of 1990 demand by 2012, but about 40 percent of that total is accounted for by biomass fuel use. Industrial demand for fuels remains low. The share of oil products in DPRK energy demand, as well as the share of electricity, are considerably lower in 2012 than in 1990. Primary fuel requirements reach 60 percent of 1990 levels by 2012, but coal attains only 37 percent, and oil only 47 percent of 1990 levels of consumption. Electricity output in 2012 under the "Decline" path is just over 80 percent of output as of 1990, and 40 percent of electricity output is exported.

Slow recovery of the DPRK energy sector relative to its 1990 "high tide:" The results of the "Slow recovery" path analysis include the following:

- Overall fuels demand returns to about 70 percent of year 1990 demand by 2012, and the share of demand provided by oil products and electricity increase.
- Primary fuel requirements rise to slightly more than 75 percent of 1990 levels by 2020, with coal

requirements a bit more than half of 1990 levels, but oil, hydroelectric, and nuclear (starting in 2007) energy use higher than in 1990.

- Electricity output is about 20 percent higher in 2020 than in 1990, but the entirety of the increased output and more is exported energy from the KEDO reactors.

Sustainable recovery of the DPRK energy sector relative to its 1990 "high tide.": The "Sustainable Development" path results in overall fuels demand rising gradually after 2000, but to only about 62 percent of "Recovery" path levels by 2012. Relative to the "Recovery" path, the "Sustainable Development" path yields substantial reductions in industrial, residential, and public/commercial sector energy use by 2012. Shares of oil products and electricity rise in the "Sustainable Development" path, but primary fuel requirements are only 84 percent of "Recovery" levels by 2012, and only 64 percent of 1990 levels. Primary coal and oil use are 37 and 100 percent of 1990 levels by 2012, respectively. Electricity output in the "Sustainable Development" path is about the same in 2012 as it was in 1990, but output of electricity for domestic use is on the order of a third lower than that in 1990.

We asked the following "energy-related" questions within each scenario:

- Is the Agreed Framework intact?
- Are the two light water reactors completed?
- What happens to the DPRK energy economy (decline, slow recovery, sustainable development)?
- Are the electric grids connected in the scenario?
- Are WMD used, proliferated, or kept at bay?

Phoenix Energy Future: As is shown in Figure 6, the full-scale war in the DPRK reduces its energy sector to rubble or "complete decline" that we did not simulate in our quantitative forecasts. The Agreed Framework collapses, the energy sector declines and is then "abolished" by war, but the grid is rebuilt quickly after reunification and is connected quickly to the regional grids. No WMD are used and the reunified Korean state remains non-nuclear and allied with the United States.



Gridlock Energy Future: Due to the diversion of US forces and North Korean intransigence backed by China, the Agreed Framework collapses and the light water reactors are not completed. The DPRK energy economy declines and the grid is connected only between DPRK and the Russian Far East. Although there is no use of WMD, the nuclear reactor meltdown in the ROK, US-Chinese conflict, and the DPRK test-firing of another missile over Japan causes first Japan, then the ROK, then the DPRK to proliferate nuclear weapons creating a region of small and great powers armed with WMD—a state of affairs that is not conducive to trade and other forms of economic cooperation such as coordination to overcome energy and environmental insecurity.



Great Leader 3 Energy Future: After a WMD attack on USFK in Seoul, the US attacks the light water reactors. The ROK and DPRK repair the reactors and connect them to the ROK grid. The DPRK energy economy slowly recovers. As US forces are occupied in Southeast Asia, the ROK-DPRK mobilize against Japan and sea lanes for oil flows into the East Sea of Korea/Sea of Japan are disrupted, throwing oil markets into chaos.



Mujige-Rainbow Energy Future: The Agreed Framework succeeds so well that it becomes a driving force for further cooperation between the US-DPRK and the DPRK-ROK. Not only are the grids connected between the ROK and the DPRK, but also with the Russian Far East and China—a project completed under the expanded mandate of KEDO. The DPRK nuclear threat is no more, and neither conventional nor WMD means of war or threat have much to do with political developments in Korea. However, US Forces Korea remains in place due to the preference of both Koreas to “balance” against the other great powers in the region.



APPENDIX 4: DPRK ENERGY PATHWAYS

This description of three indicative DPRK energy pathways for 2000-2010-2020 is excerpted from section 5 of *Summary Report of the Asia Energy Security Project Activities and Accomplishments, 2001 to 2002*, a report to the US Department of Energy, May 2002.

The Democratic Peoples' Republic of Korea

Nautilus Institute staff prepared an illustrative set of three energy paths for the DPRK. The starting point for the preparation of these paths was Nautilus' DPRK energy sector analyses, prepared in 1995 through 1997[6], and previous “Recovery” and “Decline” path projections to the year 2005. The paths presented here are subjective, illustrative updates of paths prepared in previous work taking into account changes in the DPRK since 1996, and Nautilus' informal assessment of current prospects for change. The work presented here is **NOT** based upon actual quantitative analysis of recent DPRK data. As noted above and below, an analysis of year 2000 energy demand and supply in the DPRK, and a revised paths analysis will be topics of research in the coming months.

For the illustrative DPRK presented here, three primary paths were investigated: “**Recovery**”, “**Continued Decline**”, and “**Sustainable Development**”.

The “**Recovery**” Path is built upon the following assumptions:

- With some political and economic opening, coupled with increased foreign aid, the DPRK economy starts to rebuild in approximately 2003.
- Industrial production increases, particularly in the lighter industries; and there is increased demand for transport.
- There is an increase in household energy use, with trends toward using more electricity, LPG, and kerosene in homes.
- There is a considerable increase in commercial sector activity, and a relatively small increase in military sector energy use.
- Refurbishment of electric transmission and distribution infrastructure takes place, coupled with refurbishment of existing hydro plants, building of new hydro capacity, the re-starting and expansion of the DPRK's east coast refinery, and partial retirement of coal-fired electricity generating capacity.
- Modest improvements in energy efficiency take place.

Driving assumptions for the “**Continued Decline**” Path include:

- No significant economic or political opening occurs, and the DPRK undertakes only modest rapprochement with the United States and the ROK.
- Though the DPRK economy doesn't really decline relative to 2000, it continues stagnating. Foreign aid and domestic policies keep the economy going at a low level, but there is little (if any) growth in per-capita energy use.
- Existing (operating) energy infrastructure is maintained just enough to keep it operating.
- There is no significant increase in energy efficiency.

The third path evaluated, the “**Sustainable Development**” path, is based on and provides the same energy services as the “Recovery” path, but also assumes:

- There is aggressive implementation of energy efficiency measures to reduce coal and electricity use per unit of energy service delivered.
- There is a more rapid phase-out of existing coal-fired power plants, the addition of an LNG terminal and a Gas combined-cycle power plant in about 2011, and the addition of an IGCC (integrated gasification combined-cycle) plant in 2015.
- Wind power development occurs, along with hydro plant refurbishment and the construction of new (including small) hydroelectric plants.

All three of the paths summarized above assume that the nuclear power plants (approximately 2 GW of light water reactor capacity) being built by KEDO in the DPRK will be on line in 2007, operate reliably, and primarily export power (to the ROK or China). No assumptions made about nuclear

waste disposition arrangements.

The results of the "**Recovery**" path analysis include the following:

- Overall fuels demand returns to about 90 percent of year 1990 demand by 2020, and the share of demand provided by oil products and electricity increase.
- Primary fuel requirements rise nearly to 1990 levels by 2020, with coal requirements lower than 1990 levels, but oil, hydroelectric, and nuclear (starting in 2007) energy use higher than in 1990.
- Electricity output is about 50 percent higher in 2020 than in 1990, but much of the increased output is exported energy from the KEDO reactors.
- In terms of environmental performance, the GWP (global warming potential) of air pollutant emissions, and the emissions of carbon dioxide (CO₂) and nitrogen oxides (NO_x) are about 15 percent lower in 2020 than in 1990, and sulfur oxides SO_x emissions are 25 percent lower.

Energy demand in the DPRK under the Recovery path is shown in Figure 7.



In the "**Decline**" path, overall fuels demand rises gradually after 2000 to about 60% of 1990 demand by 2020, but nearly half of that total is accounted for by biomass fuel use. Industrial demand for fuels remains low. The share of oil products in the DPRK sector, as well as the share of electricity, are lower in 2020 than in 1990. Primary fuel requirements reach 62 percent of 1990 levels by 2020, but coal attains only 40 percent, and oil only 47 percent of 1990 levels of consumption. Electricity output in 2020 under the "Decline" path is less than in 1990, and 35 percent of electricity output is exported. On the environmental side, the overall GWP in 2020, as well as emissions of CO₂, NO_x, and SO_x, are 60 or more percent lower in 2020 than in 1990. Figure 8 shows DPRK energy demand by sector for the "Decline" path.



The "**Sustainable Development**" variant of the "Recovery" path results in overall fuels demand rising gradually after 2000, but to only about 70% of "Recovery" path levels by 2020. Relative to the "Recovery" path, the "Sustainable Development" path yields substantial reductions in industrial, residential, and public/commercial sector energy use by 2020. Shares of oil products and electricity rise in the "Sustainable Development" path, but primary fuel requirements are only 65 percent of "Recovery" levels by 2020, and only 60 percent of 1990 levels. Coal and oil use are 42 and 134 percent of 1990 levels by 2020, respectively. Electricity output higher in 2020 than in 1990 in the "Sustainable Development" path, but output of electricity for domestic use is lower than in 1990. The GWP of pollutant emissions and total CO₂ emissions are half of 1990 levels, and 60 percent of "Recovery" levels by 2020. Figure 9 shows the difference in sectoral consumption over time between the "Sustainable Development" and "Recovery" paths. Figure 10 illustrates the difference in overall fuels demand between the three paths over time.



The next steps on the DPRK energy paths analysis will include:

- The review and analysis of DPRK energy sector and economy information since 1996.
- The preparation of a year 2000 energy balance for the DPRK.
- A reconsideration of existing paths based on the new year 2000 energy balance, and on thoughts about the future as developed during Nautilus workshops and in conversations with colleagues in the region and elsewhere.
- The addition of costs (for demand devices, supply infrastructure, and resources/imports) in order to evaluate the relative outlays needed to achieve different energy paths.
- Debugging of the DPRK data set, and iteration of the analysis, as required, based on new data and insights.

[1] Hereafter North Korea is referred to as NK rather than as DPRK, its formal acronym for Democratic People's Republic of Korea; and South Korea is referred to as SK rather than as ROK for Republic of Korea.

[2] For a recent example of this argument, see Notra Trulock, "Going Nuclear in North Korea," *Washington Times*, 6/25/02.

[3] For a discussion of some of the issues surrounding the Agreed Framework, see David Von Hippel, Peter Hayes, Masami Nakata, Timothy Savage, and Chris Greacen, "Modernizing the Agreed Framework," at <http://www.nautilus.org/papers/energy/ModernizingAF.pdf>

[4] See *Asian Perspective: Special Issue on the Energy Crisis and Renewable Energy Development in North Korea* (vol. 26, no 1, 2002); and <http://www.nautilus.org/dprkrenew/index.html>.

[5] Nautilus Institute has conducted two workshops in China that brought together leading regional experts to discuss a power grid interconnection for Northeast Asia. For more information, please visit the website at: <http://www.nautilus.org/energy/grid/gridindex.html>.

[6] See footnote 2.

View this online at: <https://nautilus.org/global-problem-solving/scenarios-for-the-future-of-s-north-korean-relations-engagement-containment-or-rollback/>

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