

# BACKGROUND

No. 2764 | MARCH 21, 2013

## U.S.–South Korea Nuclear Cooperation: Agreeing on Commercial and Nonproliferation Goals

Jack Spencer

### Abstract

*The agreement between the United States and South Korea that allows U.S. commercial nuclear exports to South Korea expires in March 2014. An extension must be negotiated by spring 2013. Failure to negotiate the extension would have substantial negative safety, technological, economic, and nonproliferation impacts on both countries. Still, the negotiations have become controversial. South Korea is seeking access to a broader spectrum of technology, while the U.S. wants to maintain tighter controls. The resolution lies somewhere in between. A fair agreement will recognize South Korea's emerging role as an international leader in the global commercial nuclear industry by allowing it access to the technologies it needs, such as proliferation-resistant used-fuel-management technology, while maintaining tighter controls on technologies such as enrichment, which the U.S. correctly understands as carrying a higher proliferation risk.*

This paper, in its entirety, can be found at <http://report.heritage.org/bg2764>

Produced by the Thomas A. Roe Institute for Economic Policy Studies

**The Heritage Foundation**  
214 Massachusetts Avenue, NE  
Washington, DC 20002  
(202) 546-4400 | [heritage.org](http://heritage.org)

Nothing written here is to be construed as necessarily reflecting the views of The Heritage Foundation or as an attempt to aid or hinder the passage of any bill before Congress.

The agreement between the United States government and the Republic of Korea (ROK) that allows commercial nuclear trade between the countries, referred to as a “123 agreement” since it is required by Section 123 of the Atomic Energy Act,<sup>1</sup> expires in March 2014.<sup>2</sup> To avoid any lapses, the Obama Administration must conclude negotiations by spring 2013. This will allow the agreement to take effect after it remains before Congress for 90 consecutive days of session as required by law. Due to the extensive integration of the two nations’ commercial nuclear energy programs and nonproliferation policies, failure to complete the extension would have substantial negative technological, economic, and nonproliferation impacts on the U.S. and South Korea.

Despite so much at stake, the negotiations have become controversial. South Korea, driven by its emerging role as a commercial nuclear leader, would like to expand its access to fuel-cycle technologies, including enrichment and reprocessing, beyond that which has generally been available. The United States, on the other hand, is driven primarily by concerns about nuclear weapons proliferation on the Korean peninsula and is pressing for an agreement

### KEY POINTS

- The United States and the Republic of Korea have a decade-long history of cooperation that has yielded significant economic, nonproliferation, and technological benefits for both sides.
- The agreement that allows this cooperation expires in 2014, and negotiations for an extension have become controversial as South Korea is seeking access to a broader spectrum of technologies, including reprocessing and enrichment.
- The United States is pressing for an agreement that keeps tighter controls on those technologies.
- The respective goals of nonproliferation and nuclear technological advancements are not mutually exclusive, and could reinforce one another if done correctly.
- A fair agreement will be one that recognizes South Korea’s emerging role by allowing it access to the technologies that it needs, such as proliferation-resistant used-fuel-management technology, while maintaining tighter controls on technologies such as enrichment, which the United States correctly understands as carrying a higher proliferation risk.

that is more consistent with traditional 123s, and that keeps tighter controls on those technologies. Ultimately, the resolution lies somewhere in between.

The respective goals of nonproliferation and nuclear technological advancements are not mutually exclusive, and, indeed, they could reinforce one another if done correctly. If these challenges are overcome, the U.S.–ROK agreement has the potential to not only continue beneficial trade between both nations, but also to influence the international growth of nuclear power into healthy and productive channels.

Further, failure to reach an agreement could stir nationalist feeling amongst progressives in South Korean society who rebel against any perceived U.S. pressure. Contentious negotiations could be used to fuel anti-American emotions and cause unnecessary strains in the U.S.–ROK relationship.

### **The U.S., South Korea, and the Growth of Commercial Nuclear Power**

Over 430 commercial nuclear power plants are currently operational in 29 countries, providing nearly 14 percent of the world's electricity. This power is emissions free, extremely reliable, and very affordable, which is why many countries are pursuing an expansion of the technology. Sixty-three reactors are today under construction with another 160 either ordered or planned.<sup>3</sup>

Of these new reactors, five are officially under construction in the United States and 10 more applications for 16 additional units remain under U.S. Nuclear Regulatory Commission (NRC) review. A key component supplier for these projects is South Korea. Indeed, South

Korea is supplying most of the major components for those reactors.<sup>4</sup>

South Korea is also expanding its domestic use of nuclear power and has three reactors under construction with six more planned in the near term. Today, 23 reactors provide about one-third of South Korea's electricity (20.7 gigawatts). By 2030, South Korea intends to operate 40 units, an expansion of nearly 60 percent.<sup>5</sup> Key to this growth is American technology. In fact, most of South Korea's current reactors, and all of those currently in the construction or planning process, are based on U.S. technology.

Though this cooperation has resulted in billions of dollars in U.S. business,<sup>6</sup> it really represents only a fraction of the potential benefit that continued cooperation would yield. South Korea is positioning itself to be a leading supplier of reactors to the international market. This was most clearly demonstrated with its winning bid to construct four reactors for \$20.4 billion in the United Arab Emirates (UAE). Because South Korea's technology comes from America, this project alone will bring roughly \$2 billion in business to U.S. suppliers and 5,000 jobs across the country.<sup>7</sup>

Success with the UAE contract will lead to more opportunities for South Korea. Indeed, South Korea believes that it can export up to 80 reactors worth over \$400 billion in the next two decades, which would be about 20 percent of new global construction.<sup>8</sup> The key will be to build the reactors on time and on budget. Domestically, South Korea is able to build reactors for just over \$3 billion and is estimating the cost for the UAE reactors at around \$5 billion.<sup>9</sup> Compared to U.S.

1. Atomic Energy Act of 1954, as amended, Public Law 83-703. As a helpful resource, see also Paul Kerr and Mary Beth Nikitin, "Nuclear Cooperation with Other Countries: A Primer," Congressional Research Service, June 19, 2012, <http://www.fas.org/sgp/crs/nuke/RS22937.pdf> (accessed February 1, 2013).
2. Agreement for Cooperation Between the Government of the United States of America and the Government of the Republic of Korea Concerning Civil Uses of Atomic Energy, as amended, February 3, 1956, [http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/Korea\\_South\\_123.pdf](http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/Korea_South_123.pdf) (accessed February 1, 2013).
3. "World Nuclear Power Reactors and Uranium Requirements," World Nuclear Association, January 1, 2013, <http://www.world-nuclear.org/info/reactors.html> (accessed February 1, 2013).
4. "SCG&E Orders Two AP1000s for South Carolina," World Nuclear News, May 28, 2008, [http://www.world-nuclear-news.org/NN-SCGandE\\_orders\\_two\\_AP1000s\\_for\\_South\\_Carolina\\_site-2805084.html](http://www.world-nuclear-news.org/NN-SCGandE_orders_two_AP1000s_for_South_Carolina_site-2805084.html) (accessed February 8, 2013).
5. Mark Holt, "U.S. and South Korean Cooperation in the World Nuclear Energy Market: Major Policy Considerations," Congressional Research Service, January 28, 2013, p. 5, <http://www.fas.org/sgp/crs/row/R41032.pdf> (accessed February 8, 2013).
6. Daniel Lipman, "What's Next for the U.S.–Korea Alliance?" testimony before the Subcommittee on Asia and the Pacific, Committee on Foreign Affairs, U.S. House of Representatives, June 6, 2012, <http://www.nei.org/publicpolicy/congressionaltestimony/testimony-to-the-house-foreign-affairs-subcommittee-on-asia-and-the-pacific---whats-next-for-the-us-korea-alliance/> (accessed February 1, 2013).
7. Holt, "U.S. and South Korean Cooperation in the World Nuclear Energy Market," p. 8.
8. Shinhye Kang, "South Korea Targets \$400 Billion Nuclear Plant Orders," Bloomberg News, January 13, 2010, <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aJWXIThra154> (accessed February 8, 2013).
9. Holt, "U.S. and South Korean Cooperation in the World Nuclear Energy Market," p. 8.

estimates of around \$7 billion per reactor, either price would be a bargain.<sup>10</sup>

South Korea also plans to compete for the \$78 billion reactor operations, maintenance, and repair market. Bearing in mind that most of South Korea's technology originated in the U.S., continued cooperation with South Korea could have a significant American jobs impact. Based on the U.S. contribution to the UAE project, South Korea's commercial nuclear expansion could lead to \$80 billion in U.S. exports.

Perhaps most important, cooperation will have a serious nuclear safety, security, and nonproliferation impact. Because South Korea's reactors rely on U.S. origin technology, the United States can directly influence the conditions under which the technology is exported.

### **Advance Consent: Who Has It; Why South Korea Wants It**

Generally, while 123 agreements do not broadly prohibit enrichment or reprocessing, they do prohibit cooperating nations from using American-origin technology or material for those purposes without providing some type of consent. These restrictions generally make sense as most nations with small commercial nuclear programs have no legitimate need for enrichment or reprocessing.

Depending on the details of the situation, exemptions are provided in a number of ways. Advance consent is sometimes offered as part of 123 agreement negotiations, and other times subsequent arrangements are made that require additional congressional actions. For example, arrangements allowing for enrichment or reprocessing have been established with Japan, Russia, India, and the European Atomic Energy Community (Euratom), among others.<sup>11</sup> Traditionally, however, nations for whom such exceptions have been made already maintained enrichment or reprocessing capacity before a 123 agreement was negotiated.

South Korea is different, however. While it does not currently reprocess used nuclear fuel or enrich uranium,

there is a strong argument for expanding its access to those technologies based on its domestic commercial nuclear ambitions. If it goes forward as currently planned, South Korea will have a clear requirement for additional fuel and waste management services. But the case goes beyond its domestic requirements; it has broad export ambitions as well.

While being cost competitive will be a key to South Korea's export success, it is not the only variable that matters. Nuclear reactors need nuclear fuel and ultimately produce used nuclear fuel (or waste). Major nuclear suppliers, such as France, Russia, the United States, and Japan all offer some level of fuel and waste management services as part of their commercial nuclear bids. South Korea sees restrictions on its ability to offer such services under its current 123 agreement as a major competitive disadvantage.

South Korea also points to its long history of research and development cooperation with the United States as further evidence of its need and ability to engage in waste management.<sup>12</sup> Indeed, the two nations are currently researching and developing the precise waste management technology—pyroprocessing—that South Korea is seeking the U.S.'s consent to use. It does not seem unreasonable that a U.S. ally with a long history of commercial nuclear cooperation would seek to take full advantage of the very technology that it is developing with the United States.

### **Enrichment and Reprocessing: Great Privilege Means Great Responsibility**

The United States has long been concerned with controlling enrichment and reprocessing technologies because they can provide a latent capacity to build nuclear weapons. Indeed, under certain circumstances, such technologies could lead a country to become a de facto weapons state.<sup>13</sup> The challenge for U.S. policymakers has been to promote the peaceful development of commercial nuclear technology without increasing nuclear weapons

10. Rebecca Smith, "New Nuclear Plant Hits Same Snag," *The Wall Street Journal*, December 23, 2012, <http://professional.wsj.com/article/SB10001424127887324731304578193880676864240.html?mg=reno64-wsj> (accessed February 8, 2013).

11. Fred McGoldrick, "Nuclear Trade Controls: Minding the Gaps," Center for Strategic and International Studies, January 2013, pages IX-X, [http://csis.org/files/publication/130122\\_McGoldrick\\_NuclearTradeControls\\_Web.pdf](http://csis.org/files/publication/130122_McGoldrick_NuclearTradeControls_Web.pdf) (accessed February 8, 2013).

12. The latest installment of which is the Joint Feasibility Study for Pyroprocessing Research, a 10-year study which started in 2011.

13. "De facto nuclear states" refers to those states that before, or outside, the Non-Proliferation Treaty acquired nuclear weapons, of which there are at least four: India, Israel, Pakistan, and North Korea. To prevent further proliferation of weapons technology, U.S. policy should convince these states to relinquish nuclear weapons and hold to the NPT. See also Baker Spring and Dana Robert Dillon, "Nuclear India and the Non-Proliferation Treaty," *Heritage Foundation Backgrounder* No. 1935, May 18, 2006, <http://www.heritage.org/research/reports/2006/05/nuclear-india-and-the-non-proliferation-treaty>.

proliferation risks.<sup>14</sup> This objective has largely been met by creating a multilayered system of export controls and nonproliferation safeguards that provide direct oversight and early warning of illicit activities.<sup>15</sup>

Undergirded by the Non-Proliferation Treaty (NPT),<sup>16</sup> this system has allowed the U.S., under certain conditions, to support the peaceful uses of enrichment and reprocessing by other nations. As a result, today most European Union members (as part of Euratom), Switzerland, Japan, and some others all enjoy some level of fuel-cycle cooperation with the United States. This system has largely worked because the United States has remained committed (as a matter of principle, policy, and law) to uphold its obligations under the NPT.

South Korea is now stepping into the role of a commercial nuclear leader, and views enrichment and reprocessing as critical to its commercial nuclear industry.<sup>17</sup> As a peaceful, democratic U.S. ally, South Korea should have access to the technology that it needs. But as the old adage goes, “With much privilege comes much responsibility.” Thus, in order for this new era of U.S.–South Korean cooperation to thrive, both sides must commit to the same level of cooperation, transparency, and nonproliferation objectives that mark the success of other such arrangements.

**Controlling Enrichment Technology.** Uranium and enrichment services are readily available on the global market from legitimate suppliers located primarily in the U.S., Russia, and Europe. Generally, these suppliers meet global demand.<sup>18</sup> The current market offers South Korea ample opportunity to develop deals to ensure fuel to any potential future customers. Further, nothing prevents

South Korea from investing in enrichment capacity on the physical territory of one of the five permanent members (P5) of the United Nations Security Council, which it is seeking to do.<sup>19</sup> This option gives South Korea all the benefits of a domestic enrichment facility without any of the risks that concern the American government. Ultimately, uranium and enrichment services are globally traded commodities. Thus the geographic dislocation of a facility in another country would have little or no impact on South Korea’s ability to compete.

The long-term goal of U.S. policy should be to limit the direct, physical location of enrichment technology to the P5, which are each legal nuclear weapons states. As such, the U.S. should highly encourage South Korea to forgo domestic enrichment and not provide advance consent for enrichment capabilities. However, the U.S. should recognize South Korea’s right to enrich uranium and be open to addressing the issue at a later date. Should a future determination be made that a domestic Korean enrichment capacity clearly outweighs the costs and risks, the U.S. and South Korea could then pursue a subsequent arrangement that meets both nations’ goals.

**To Reprocess, or Not to Reprocess.** Reprocessing is a broad term for procedures that treat spent nuclear fuel for nuclear waste management purposes, or which retrieve valuable elements usable as recycled nuclear fuel. Indeed, many of the components of used nuclear fuel could have peaceful commercial applications even beyond power production.<sup>20</sup>

Critics argue that, since one retrievable element from used commercial nuclear fuel—plutonium—can

14. Sharon Squassoni, “Nuclear Cooperation and Nonproliferation: Reconciling Commerce and Security,” testimony before the Committee on Foreign Affairs, U.S. House of Representatives, September 24, 2010, [http://csis.org/files/ts100923\\_Squassoni.pdf](http://csis.org/files/ts100923_Squassoni.pdf) (accessed February 1, 2013).
15. International Atomic Energy Agency safeguards consist of “correctness and completeness” reporting and inspections of over 140 nations, which are designed to detect questionable or nefarious nuclear activity and give the world timely warning to respond. See International Atomic Energy Agency, “IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols,” [http://www.iaea.org/Publications/Factsheets/English/sg\\_overview.html](http://www.iaea.org/Publications/Factsheets/English/sg_overview.html) (accessed February 1, 2013).
16. The Non-Proliferation Treaty is a legally binding document that calls for greater disarmament, prevention of the spread of nuclear weapons, and the promotion of peaceful nuclear activity. It endows the IAEA with the authority to set and enforce safeguards. It also recognizes the right of all signatories to the full spectrum of commercial nuclear technology in exchange for a promise to refrain from nuclear weapons. See International Atomic Agency, “Treaty on the Non-Proliferation of Nuclear Weapons,” <http://www.iaea.org/Publications/Documents/Treaties/npt.html> (accessed February 12, 2013).
17. Park Seong-won, Miles Pomper, and Lawrence Scheinman, “The Domestic and International Politics of Spent Nuclear Fuel in South Korea: Are We Approaching Meltdown?” Korea Economic Institute *Academic Paper Series* No. 3, Vol. 5, March 2010, <http://keia.org/sites/default/files/publications/APS-ParkPomparScheinman.pdf> (accessed February 1, 2013).
18. Jack Spencer and Daniella Markheim, “Protectionism Won’t Fuel a Nuclear Renaissance,” Heritage Foundation *Backgrounder* No. 2221, December 16, 2008, <http://www.heritage.org/research/reports/2008/12/protectionism-wont-fuel-a-nuclear-renaissance>.
19. Meeyoung Cho, “EPCO/Urenco in Talks for Stake in U.S. Uranium Plant,” Reuters, November 21, 2012, <http://www.mineweb.com/mineweb/content/en/mineweb-fast-news?oid=163159&sn=Detail> (accessed February 26, 2013).
20. The Nuclear Green Revolution, “Kirk Sorensen Asks, ‘Is Nuclear Waste Really Waste?’” video presentation, November 21, 2010, <http://nucleargreen.blogspot.com/2010/12/kirk-sorensen-asks-is-nuclear-waste.html> (accessed February 1, 2013).



potentially be used to build nuclear weapons, the process should be strictly controlled.<sup>21</sup> This general contention is correct. However, not all activities that might be described as reprocessing include separating out plutonium. Instead of blanket prohibitions, the focus should be on those processes that separate out weapons-useful materials during fuel cycle processes. The near-term focus should be to limit enrichment and reprocessing technologies from spreading to countries that do not currently have the technology or that lack a compelling commercial reason to acquire them. The long-term goal should be to limit activities that result in the production of weapons-usable material to P5 nations. All related processes should be subject to adequate nonproliferation safeguards.

Broad, unspecific prohibitions fail to recognize that there is no single way to treat used nuclear fuel, or that new processes could be developed in the future. The results of reprocessing depend entirely on the reactor type used, the type of fuel being reprocessed, and the processing technique used to treat the used fuel. A blanket prohibition makes no sense given all of these variables. In the case of South Korea, it unnecessarily denies the country access to a potentially critical part of a comprehensive nuclear waste management strategy.

### **A Good 123 Agreement Promotes U.S. and ROK Interests**

The U.S. and South Korea should negotiate a 123 extension that allows South Korea access to the technology that it requires, while addressing U.S. proliferation concerns. Failure to do so would deny both nations the full benefit of greater commercial nuclear cooperation.

Instead, a 123 agreement that recognizes the certainty of South Korea's growing role in commercial nuclear power, while using the myriad tools available to control dangerous technologies would advance U.S. interests by:

- **Maximizing America's and South Korea's influence on the global expansion of commercial nuclear power.** Because so many commercial nuclear options exist in the global market, South Korea is not confined to cooperation with the United States to achieve its commercial nuclear objectives. The absence of a 123 agreement would likely force South Korea to simply choose not to cooperate with the United States,

considering the importance of nuclear power to its domestic energy needs and intentions to expand globally (a goal it is currently pursuing in cooperation with the U.S. through the UAE deal). The outcome of an overly strict agreement could be similar over the long term if Korea finds that doing business with more flexible non-U.S. suppliers is a better option. Either way, the end result will be less business and influence for U.S. and Korean companies.

- **Promoting U.S. regulatory and safety standards.** Some of the most important nuclear exports that the United States can offer are its regulatory, safety, and operational standards. The American nuclear industry is among the world's safest and most efficient. This is a direct result of its system of private operators working with both private and government regulators. Whether from a commercial, nonproliferation, or safety standpoint, new and most existing nuclear nations could benefit from working with the United States. The best way to ensure that nations incorporate American regulatory standards is for U.S. suppliers to be fully engaged with foreign nuclear programs. Japan's Fukushima experience demonstrates the risk of not fully integrating best practices from around the world. Many of Japan's mistakes could have been avoided had it implemented some of the reforms that have taken place in the U.S.—such as establishing an independent regulatory agency or having clear chains of operational command at nuclear plants.<sup>22</sup> A strong 123 agreement will not only help the U.S. to influence South Korea's domestic nuclear industry, but will ensure that these high standards are carried forward as Korea exports reactors and related technology.
- **Enhancing nonproliferation efforts.** Fewer 123 agreements could hurt U.S. nonproliferation efforts because it would disengage the United States from the nuclear programs of other countries, such as South Korea. This vacuum is an opportunity for non-U.S. suppliers with potentially lower standards to determine how a cooperating nation handles nonproliferation issues. By engaging with nations as they build their commercial nuclear programs, the United States will be better positioned to have greater influence over those nations' general approach to nonproliferation;

21. World Nuclear Association, "Plutonium," March 2012, <http://www.world-nuclear.org/info/inf15.html> (accessed February 1, 2013).

22. Jack Spencer, "Nuclear Disaster Like Fukushima Unlikely in U.S.," *Heritage Foundation Commentary*, July 8, 2011, <http://www.heritage.org/research/commentary/2011/07/nuclear-disaster-like-fukushima-unlikely-in-us>.

123 agreements also give the U.S. authority to determine where its technology is ultimately re-exported. This is especially important as countries like Indonesia, Saudi Arabia, Thailand, and Vietnam seek to establish commercial nuclear programs.

- **Increasing U.S. competitiveness.** Though security concerns outweigh commercial interests, commercial interests should not be ignored. One of the direct results of an overly restrictive approach to controlling commercial nuclear exports will be its impact on the U.S. nuclear industry, which is attempting to rebuild after decades of reactor-construction stagnation. A key to that rebuilding effort will be to ensure access to the global nuclear market—and the Korea 123 agreement is pivotal to that access. According to the U.S. Department of Commerce, 5,000 to 10,000 jobs are supported by every \$1 billion in nuclear exports. Considering that the Department of Commerce estimates that the global nuclear market over the next 10 years will be valued between \$500 billion and \$740 billion, potential job creation is significant. In order to take advantage of this opportunity, the U.S. needs 123 agreements.<sup>23</sup>
- **Promoting the 123 process as viable for other nations.** Section 123 agreements are a major nonproliferation and commercial tool for the United States. Having them in place creates a strong legal framework to govern the export of U.S. commercial nuclear technology. If structured and maintained properly, they can influence the entire commercial nuclear program of cooperating nations. This is especially important as it relates to South Korea, given its growing role as a commercial nuclear exporter. But offering 123 agreements that are not attractive or realistic will simply lead to fewer 123 agreements, hurting the U.S. in the long run.

## What the U.S. Can Do

Because both nations are major nuclear suppliers, and because the two nuclear industries are deeply intertwined, failure to extend the 123 agreement would have

repercussions around the world. Certainly, absent such an agreement, American companies would be constrained in selling nuclear equipment and technology in South Korea. Because South Korea still relies so heavily on American technology, it would be limited in its ability to export peaceful nuclear products. Ultimately, South Korea would adjust by finding non-American partners. For the United States, the impact could go beyond nuclear commerce. America would not only lose a significant business partner. A lapse in U.S. cooperation with South Korea also would signal to the world that the United States is no longer a reliable partner in nuclear energy. This would impair U.S. exports to a large and growing global market and dilute U.S. national interests in global nuclear safety, security, and nonproliferation.

Both nations stand to benefit from the successful renewal of the 123 agreement. Timely renewal of the agreement would reaffirm a vital strategic partnership while setting a new path for commercial nuclear power. In order to achieve these benefits, the United States must recognize and accommodate South Korea's growing role as a full-service commercial nuclear supplier. South Korea must recognize America's concerns regarding the proliferation of sensitive nuclear technologies. To this end, the United States government should:

- **Complete negotiation of the United States–Republic of Korea 123 extension as soon as possible.** According to all estimates, nuclear power will expand substantially over the next few decades.<sup>24</sup> The sooner the U.S. and South Korea can conclude the 123 extension, the more competitive companies from both countries can be in winning those tenders. U.S. participation in these projects advances multiple national interests. From an economic perspective, commercial nuclear business in either country will directly result in jobs in both. An American presence also promotes U.S. interests in nuclear safety, security, and nonproliferation by ensuring that new commercial nuclear programs around the world rely on the strictest safety, security, and nonproliferation standards.<sup>25</sup>

23. News release, "Commerce Report: Small Modular Nuclear Reactors Can Help Meet Future Energy Demands, Create American Jobs," International Trade Administration, U.S. Department of Commerce, February 16, 2011, <http://trade.gov/press/press-releases/2011/commerce-report-small-modular-nuclear-reactors-can-help-meet-future-energy-demands-create-american-jobs-021611.asp> (accessed February 1, 2013).

24. Global installed nuclear generating capacity is expected to go from 390 GW in 2011 to 644 GW in 2035. Though net generation and consumption of nuclear energy is expected to grow the world around, this rate of growth in non-OECD Asia is unmatched in any other region of the world, going from producing 193.015 billion kwh in 2011 to 1281.016 billion kwh in 2035. U.S. Department of Energy, Energy Information Administration, World Net Nuclear Electricity Generation from Central Producers by Region and Country, Reference Case, 2005 to 2035.

25. McGoldrick, "Nuclear Trade Controls: Minding the Gaps."

- **Clarify that used-fuel processes that do not separate weapons-usable materials are permitted.** Restrictions on reprocessing are based on the problems that arise from separating weapons-usable materials from used fuel. Processes that do not result in weapon-usable material should not be treated as reprocessing. Therefore, the United States should clarify that South Korea is permitted to pursue fuel-treatment processes that do not result in the separation of weapons-usable material.
- **Continue to support reprocessing research and development.** The United States and South Korea have a long history of cooperation on a broad spectrum of fuel-cycle technologies, including reprocessing. Given the potential of reprocessing for used-fuel management, even those that could lead to separating plutonium, South Korea has a legitimate desire to explore that technology. The U.S. should continue to support joint research and development activities. Should future conditions warrant moving beyond research and development, the United States and South Korea should develop a subsequent agreement.
- **Respect South Korea's right to peacefully enrich uranium but continue to oppose uranium enrichment on the Korean peninsula for the time being.** The current market for enrichment services is adequate to meet a growing global demand, and South Korean companies can collaborate with international fuel suppliers to meet the needs of customers. Ultimately, an enrichment capability for any nation potentially creates, at a minimum, the latent capacity to produce weapons-usable materials, bringing any such state a step closer to being a de facto nuclear weapons country. Given the nonproliferation policy risks of expanding enrichment in today's geopolitical context, especially in terms of the unique national security concerns on the Korean peninsula, the risk of supporting enrichment outweighs any potential

benefit. That said, the U.S. should not compel South Korea to forswear any future rights to the technology. Should a future determination be made that a domestic Korean enrichment capacity clearly outweighs the costs and risks, the U.S. and South Korea could then pursue a subsequent arrangement that meets both nations' goals.

### **Setting the Tone with a Strong U.S.–ROK 123 Agreement**

The world is entering a new era of commercial nuclear growth that is only in the very early stages. New technologies and growing economic wherewithal are allowing nations to consider nuclear power as they never could have before. Though nuclear energy can bring great benefits, an expansion also creates new challenges. That is why any expansion of fuel-cycle-technology access must be accompanied by a clear statement that, as a matter of principle, policy, and law, the U.S. and South Korea both commit to upholding their obligations under the Non-Proliferation Treaty as their cooperative efforts grow.

As significant actors in the nuclear industry, both Korea and the United States have critical roles in meeting these challenges. These roles must be fulfilled in a way that recognizes the global nature of the 21st-century nuclear industry and encourages, rather than complicates, business and cooperation between responsible countries without sacrificing nonproliferation objectives. The U.S.–ROK agreement is a critical opportunity to consider and accomplish how to influence and channel the growth of nuclear power into healthy and productive channels. Ultimately, America and the rest of the world must rethink how to govern international nuclear commerce. Now is the time to start that process. The negotiation to extend the 123 agreement between America and South Korea is a promising place to start.

—*Jack Spencer is Senior Research Fellow in Nuclear Energy in the Thomas A. Roe Institute for Economic Policy Studies at The Heritage Foundation.*