

Rethinking the U.S.-South Korea 123 Agreement in a New Strategic Era

By Kayla T. Orta

On November 25, 2015, the United States and South Korea’s joint civil nuclear technology agreement, also known as the “Section 123 Agreement,” entered into force, establishing a twenty-year framework for the two nations’ bilateral cooperation.¹ A decade later, geopolitical shifts in the global civil nuclear market, alongside changing regional security dynamics, are driving a careful reconsideration—and potential expansion—of the current structure of the U.S.-South Korea nuclear technology partnership.

Both Washington and Seoul have long emphasized the importance of the bilateral partnership on peaceful-use nuclear technologies. What makes this a critical moment for the U.S.-South Korea nuclear partnership is that recent discussions have increasingly commingled civil nuclear cooperation with hitherto unexplored nuclear technology for security and defense applications. In October 2025, U.S. President Donald Trump traveled to South Korea for his first state visit since his reelection and second diplomatic summit with South Korean President Lee Jae Myung on the sidelines of the Asia-Pacific Economic Cooperation (APEC) leaders’ summit. While the Trump-Lee summit focused on bilateral trade, economic security, and technology-focused partnerships, Trump’s post-summit announcement on October 29 granting his approval for South Korea to build nuclear-powered submarines (SSNs) took many foreign policy and military analysts by surprise.² South Korea has long argued for the benefit of SSNs in its force posture against North Korea’s rising nuclear weapons and missiles programs. Over the years, Washington has been hesitant and, at times, largely skeptical of South Korea’s intentions, due to potential regional nuclear proliferation implications.³

The post-summit Trump-Lee Joint Fact Sheet, announced in November 2025, also seemed to open the door to renewed bilateral discussion on “the ROK’s civil uranium enrichment and spent fuel reprocessing for peaceful uses,” in accordance with preexisting agreements and legal guidelines.⁴ From Seoul’s perspective, the Trump administration’s willingness to include civil uranium enrichment and reprocessing (ENR) technologies in last year’s Joint Fact Sheet indicates a shift in U.S. policy thinking, potentially signaling that the time is right for South Korea to expand its domestic nuclear technology capabilities.⁵ Ready to meet at the negotiation table, the Lee administration speedily assembled an intra-government team to explore greater flexibility for South Korean civil-use nuclear activities.⁶

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From Washington, however, the policy response has been less enthusiastic. Hesitancy among U.S. policymakers to change long-standing positions on high-risk proliferation technologies signals that, though renegotiation talks may occur, the outcomes for U.S.-South Korea civil nuclear relations remain uncertain.⁷ Overall, South Korea's bid to expand nuclear fuel cycle technologies, alongside the potential for South Korean-built SSNs in the Indo-Pacific region, calls for deeper consideration of the historical foundations and future-oriented pathways of the U.S.-South Korean bilateral nuclear partnership. As Washington and Seoul explore options to restart nuclear-focused discussions, this paper explores the key drivers of nuclear cooperation—from within and outside of the U.S.-South Korea bilateral partnership—reviews the history of today's ongoing debate, and stresses near-term political and industry-driven opportunities for both nations.

Historical Legacy: U.S.-South Korea Civil Nuclear Cooperation

Under what circumstances did the United States and South Korea first establish bilateral civil nuclear relations? And how has the partnership grown to be a pivotal discussion point in the U.S.-South Korea diplomatic and security relationship? In order to explore future pathways for U.S.-South Korea nuclear cooperation, it is important to first understand the historical context of the over seventy-year-old partnership.⁸ U.S.-South Korea civil nuclear cooperation dates back to the post-Korean War (1950-1953) period, when South Korea was seeking secure and reliable energy sources to reconstruct its national economy. Under President Dwight Eisenhower's "Atoms for Peace" initiative, the United States and South Korea signed a joint Agreement on Cooperation Concerning Civil Uses of Atomic Energy in 1956, which effectively launched their long-term relationship on the peaceful development of nuclear energy.⁹

Building on this bilateral cooperation, South Korea institutionalized its national commitment to international nonproliferation norms by joining the International Atomic Energy Agency (IAEA) in August 1957. Within South Korea's domestic legal system, the passage of the 1958 Atomic Energy Act and the establishment of the Office of Atomic Energy in 1959 laid the groundwork for a national nuclear governance structure.¹⁰ Within three years of establishing regulatory frameworks, South Korea, aided and guided by U.S. technical expertise, constructed its first research reactor, KRR-1, which reached criticality in 1962.¹¹ This technical achievement marked South Korea's official entry into the technical field of atomic energy research and development (R&D).

By the late 1960s, South Korea's rising energy demand and regional security pressures prompted further cooperation with the United States and, by extension, the IAEA. In 1967, the United States, South Korea, and the IAEA concluded an additional safeguards agreement, facilitating the successful construction of South Korea's second research reactor (KRR-2) and marking the nation's first implementation of international nuclear safeguards.¹² These early cooperative projects not only assisted the early expansion of South Korea's civilian nuclear R&D capacity but also reinforced IAEA-led nonproliferation and safeguards norms as a central pillar of the U.S.-South Korean bilateral partnership.

In the following decades, the United States and South Korea continued to expand their bilateral civil nuclear cooperation. In the 1970s, however, new geopolitical tensions briefly threatened to derail South Korea's focus on peaceful applications of nuclear technology.¹³ Concerns over North Korea's rising security threat and the potential removal of U.S. troops from the Korean Peninsula led then President Park Chung-hee to explore possible avenues for developing an indigenous nuclear weapons program. Seoul's attempts to acquire sensitive nuclear technologies from foreign suppliers raised significant concerns in Washington. In response, the United States leveraged the continuation of U.S.-South Korea technical cooperation as a means to ensure South Korea's reaffirmation of its commitment to peaceful nuclear development.¹⁴ As a result, both nations signed a revised bilateral "123 Agreement" in 1974, and South Korea reinforced its nonproliferation commitments by joining the Nuclear Non-Proliferation Treaty (NPT) in 1975. These actions marked a decisive turning point, firmly anchoring South Korea within the global nonproliferation regime.

Following its accession to the NPT, South Korea undertook additional steps to demonstrate its strong commitment to nuclear safety, security, and nonproliferation transparency, including ratifying the Convention on the Physical Protection of Nuclear Material (1982), signing the Comprehensive Nuclear-Test-Ban Treaty (1999), and adopting the IAEA Additional Protocol in 1999 (ratified in 2004).¹⁵ Furthermore, beginning in the 1970s, the South Korean government implemented a State System of Accounting for and Control of Nuclear Materials (SSAC), in line with IAEA requirements. Institutional developments followed, including the establishment of the Technology Center for Nuclear Control (TCNC) in 1994 and its successor, the Korea Institute of Nuclear Nonproliferation and Control (KINAC) in 2006, which enhanced the independence and effectiveness of safeguards implementation. Collectively, South Korea's international agreements and national-level systems for regulation and accountability reinforced international confidence in South Korea's adherence to peaceful-use nuclear practices.¹⁶

Over time, U.S.-South Korea nuclear cooperation has evolved beyond one-way technical assistance into a mature partnership characterized by both collaboration and competition in global nuclear markets. Rising rapidly through the ranks, South Korea now stands as the fifth-largest civil nuclear energy producer in the world—only outpaced by the United States, China, France, and Russia.¹⁷ Today, South Korea's state-owned companies, including Korea Electric Power Corporation (KEPCO) and Korea Hydro & Nuclear Power (KHNP), operate twenty-six reactors in-country, accounting for nearly 30 percent of the nation's energy mix.¹⁸ The nation's R&D institutions, such as the Korea Atomic Energy Research Institute (KAERI), alongside private industry leaders, including Doosan Enerbility, Hyundai Engineering and Construction (E&C), and Samsung C&T, are driving the next generation of advanced nuclear reactor technologies at home and abroad.

As a whole, the historical trajectory of U.S.-South Korea nuclear cooperation was founded upon and has benefited from the dynamic interplay of diplomatic engagement, industry-to-industry relations, and, crucially, shared civil nuclear technical and industrial know-how. Emerging from postwar reconstruction to become a globally recognized leader, South Korea's civil nuclear

program has been deeply shaped by its sustained U.S. partnership. Amid this growth, the bilateral Section 123 Agreement, most recently revised in 2015, has served as a pivotal guiding line for U.S.-South Korean civil nuclear cooperation, underscoring shared commitments to advancing peaceful-use nuclear technology in accordance with safety, security, and nonproliferation standards.

Nuclear Agendas: U.S. and South Korean Policies

For both Washington and Seoul, nuclear energy policy is gaining momentum. Under the second Trump administration, the United States aims to quadruple its domestic nuclear energy capacity to 400 gigawatts electric (GWe) by 2050.¹⁹ Since returning to the White House, Trump has launched a reinvigoration of the U.S. nuclear industry through a series of executive orders calling on the U.S. government to “accelerate the secure and responsible development, demonstration, deployment, and export of United States designed advanced nuclear technologies.”²⁰ At present, the United States operates ninety-four commercial reactors across twenty-eight states, amounting to a net generating capacity of 97 GWe.²¹ Domestically, the U.S. government has enacted policies to upscale innovation for existing reactors and provide both financial and regulatory support for building new reactors and diversifying fuel supply chains.²² Beyond this, the Trump administration aims to expand U.S. commercial relevance in the global market, proposing a goal of “at least 20 new 123 Agreements” with partner countries by early 2029.²³

Despite temporary rollbacks, South Korea’s nuclear energy policy is also undergoing sustained revitalization, with reactors under construction at home and abroad.²⁴ The country operates twenty-six reactors, with another three large-scale APR-1400 reactors under construction.²⁵ On February 21, 2025, the South Korean National Assembly approved South Korea’s Eleventh Basic Plan for Electricity Supply and Demand, which includes plans for the construction of at least two traditional large-scale reactors—with a combined electricity production of 2.8 GWe—and a first-of-a-kind 700 megawatt (MW) small modular reactor (SMR) by the late 2030s.²⁶ South Korea’s nuclear industry—often referred to as “Team Korea”—comprises leading research institutions and private engineering and manufacturing firms, representing over seventy years of technical expertise.²⁷ Beyond the Korean Peninsula, South Korea is leveraging this strong industrial base to actively expand its nuclear export opportunities. After completing construction of four APR-1400 reactors at the Barakah nuclear power plant in the United Arab Emirates, South Korea’s more recent success in securing a nuclear export project to the Czech Republic reflects its growing role in global nuclear energy deployment.²⁸

Geopolitical Trends and Global Nuclear Energy Markets

Rising global energy demand—driven in part by the development of energy-intensive technologies such as AI—is accelerating advancements in civil nuclear technologies and driving newcomer nations to politically and financially invest in partnerships with leading nuclear exporters, including the United States and South Korea.²⁹

Around the world, the nuclear energy sector is experiencing renewed momentum, marked by increased political support for and rising investments in traditional large-scale nuclear reactors and next-generation technologies, including SMRs and advanced modular reactors (AMRs).³⁰ Estimates from the U.S. Department of Commerce project that the global market for new reactors could reach USD 500–740 billion by 2030.³¹ Longer-term projections from the IAEA forecast that global nuclear capacity could expand to upwards of 992 GWe by mid-century—roughly a 2.6-fold increase over 2024 global capacity levels.³² As the global nuclear energy market evolves, Washington and Seoul are well positioned to leverage their advanced civil nuclear industries, established regulatory frameworks, and decades of operational expertise to capture emerging opportunities.

Several key geopolitical trends are shaping this evolving nuclear landscape. First, the global nuclear landscape is expanding as more countries pursue civil nuclear programs. Interest spans both emerging and established economies, with nuclear power viewed as a viable solution to meet rising energy demands and advance decarbonization goals. Following the United Nations Climate Change Conference (COP28), over thirty nations have declared their intentions to triple nuclear energy capacity by 2050.³³ Similarly, the World Nuclear Association reports that over thirty nuclear newcomer countries are currently considering, planning, or initiating nuclear energy projects.³⁴

Second, the geographic center of gravity for nuclear energy development is shifting toward the Indo-Pacific region. While historically led by the United States, Canada, and Europe, future large-scale and SMR reactor construction projects are concentrated in Asia. With nearly forty reactors under construction, China aims to reach 110 GWe of nuclear capacity by 2030, while India has announced at least seven new reactor projects for the same period.³⁵ Russia's state-owned Rosatom claims to be constructing forty-eight nuclear-related facilities, including multiple export projects across six countries.³⁶ This regional concentration reflects broader trends in economic growth and energy demand, underscoring the strategic importance of the Indo-Pacific in shaping the global nuclear energy landscape.

Third, the global nuclear market is becoming more competitive, with major suppliers seeking to secure export contracts, shape regulatory norms, and expand geopolitical influence. Chinese and Russian state-backed firms have captured significant market shares through large-scale domestic deployment and can offer competitive financing for nuclear export projects.³⁷ Against this backdrop, the United States and South Korea—both as collaborative partners and, at times, as competitors—are leveraging advanced technologies, trusted regulatory standards, and industrial capacity to offer credible alternatives. Coordinated U.S.-South Korean engagement presents a critical opportunity to expand their presence in global markets while reinforcing high standards for nuclear safety, security, and nonproliferation.³⁸

Finally, technical innovation and design diversification are reshaping the nuclear sector. AMRs and SMRs offer the potential for greater flexibility, lower upfront costs, and enhanced safety features compared to traditional large-scale reactors.³⁹ As a result, a growing number of

countries are advancing civil nuclear technologies, driving increased global investment and a growing pipeline of first-of-a-kind projects scheduled for the coming decades.

Together, these global trends point to a dynamic—and, increasingly, competitive—nuclear energy market, with significant implications for international cooperation and technological leadership. For the United States and South Korea, these changes present time-sensitive opportunities to advance domestic industries and expand participation in third-country nuclear projects.

Repeating Cycles: The U.S.-South Korea Renegotiation Debate

The U.S.-South Korean 123 Agreement, revised in 2015, established pathways to capitalize on such opportunities. To address long-standing and future challenges in the partnership, the reciprocal agreement laid the crucial legal basis for more substantial, interdependent nuclear industry cooperation.⁴⁰ As is common in diplomatic negotiations, however, the resulting agreement encapsulated both collaborative successes and structural weaknesses. To some extent, the outcomes of previous negotiations were designed to push difficult issues down the road for future discussions. Unfortunately, over ten years later, the road is looking much the same as before. Now past the midpoint of the agreement—initially set to run until November 25, 2035, with an additional five-year extension clause—there is a growing sense of urgency in South Korea that the U.S.-South Korean cooperation framework is not reaching its intended goals.⁴¹ Because of this, the United States and South Korea are once again discussing avenues to “advance nuclear cooperation initiatives,” and, if agreed upon, expanded options for the 123 Agreement.⁴²

The restart of U.S.-South Korean bilateral nuclear discussions is, in many ways, an echo of past challenges. These issues date back to the initial five-year-long renegotiations in the 2010s, which resulted in the current 123 Agreement. Previously, U.S. and South Korean negotiators, ahead of the 1974 agreement’s March 2014 expiration, began consultations on its renewal in October 2010. Both sides felt the importance of the renegotiation, as the two nations aimed to redefine the nuclear partnership from one historically rooted in South Korea’s dependence on U.S. technology to a more balanced partnership that acknowledged South Korea’s rising global status as a mature civil nuclear energy producer. As then chief negotiator Robert J. Einhorn stated, both sides wanted a “successor agreement that will expand the level of cooperation... in the civil nuclear energy area and that will reflect the increased importance that the Republic of Korea is playing in the global nuclear energy arena.”⁴³

Reportedly, the main challenges of the negotiations centered around sensitive technologies that could lead to the production of fissile material for nuclear weapons. South Korea expressed a desire to expand its civil nuclear fuel cycle—including both uranium enrichment and spent fuel reprocessing capabilities—seeking advance approval from Washington to proceed.⁴⁴ From South Korea’s perspective, these technologies would provide much-needed solutions for its advancing national nuclear energy program by removing dependence on enriched uranium imports, offsetting limited spent-fuel storage capacity, and enhancing the competitiveness of the nation’s nuclear export bid. Furthermore, South Korea argued that the U.S.-Japan 123

Agreement, which includes a provision for comprehensive, “long-term consent” for Japanese reprocessing technologies, set an unfair precedent for which U.S. allies were allowed to pursue back-end fuel cycle technologies—an argument that continues to be made today.⁴⁵

Washington, however, raised concerns over regional example-setting for these higher-risk proliferation technologies.⁴⁶ Especially in the case of the Korean Peninsula, U.S. policymakers feared that if South Korea pursued ENR technologies, it would effectively dissolve the 1992 Joint Declaration on the Denuclearization of the Korean Peninsula, which stated that neither North Korea nor South Korea would possess “nuclear reprocessing and uranium enrichment facilities.”⁴⁷ Clearly, North Korea—utilizing ENR capabilities for its nuclear weapons program—had repeatedly violated the agreement; however, the prevailing U.S. policy thought at the time stressed the importance of the 1992 inter-Korean agreement in the eventuality that North Korea returned to denuclearization talks.⁴⁸

Despite consultations in Washington and Seoul, negotiators struggled for years to balance both sides’ interests, requirements, and limitations. At the conclusion, the proposed agreement aimed to address South Korea’s nuclear aspirations within the bounds of U.S. nonproliferation policies by designing and implementing a bilateral cooperative framework to explore—and potentially open the door to—U.S. approval of South Korea’s development of ENR capabilities. As Einhorn stated during a speech in October 2013, the U.S. government’s stance on South Korea’s pursuit of ENR technologies was not a permanent “no, never” but rather a statement of “not now.”⁴⁹ As agreed upon in the 2015 123 Agreement, the route to future capabilities would run through the newly established High-Level Bilateral Commission (HLBC), which would act as the official bilateral channel for regular discussions, and a ten-year Joint Fuel Cycle Study on spent fuel storage and reprocessing technologies, including electrochemical processes such as pyroprocessing.⁵⁰

This point was well emphasized by U.S. Assistant Secretary of State for International Security and Nonproliferation Thomas M. Countryman during his statement before the U.S. Senate Committee on Foreign Relations in October 2015. He said that the renewed 123 Agreement “contains a set of pathways toward possible U.S. Government decisions in the future on whether to grant advance consent to the ROK to enrich or reprocess U.S. obligated nuclear material.”⁵¹ Critically, details as to when, where, and how these technologies would be jointly developed in the future were not specified, though the prevailing assumption was that if joint studies resulted favorably, then any advancements in commercial ENR technologies would be pursued jointly and likely under U.S. leadership and oversight.

As such, the 2015 123 Agreement exemplified mutual compromise, balancing U.S. nuclear nonproliferation concerns and South Korean nuclear industry ambitions. However, the agreement’s much-praised strengths could also be seen as its greatest weaknesses. By focusing on reaching a diplomatic win for both sides, the negotiations resulted in kicking the conversation on ENR capabilities down the road.⁵² For Washington, negotiators emphasized that the United States had not given prior consent for proliferation-sensitive technologies, while

South Korean policymakers, in turn, championed the deal as a step in the right policy direction, laying out the requisite pathway toward the future development of ENR capabilities.⁵³

Since June 2015, the gaps in U.S. and South Korean thinking on the 123 Agreement have only widened. Additionally, weaknesses in the joint implementation of the pact, as well as rifts in leading U.S. and South Korean nuclear companies, placed increasing pressure on the civil nuclear partnership. Officially launched in Seoul in 2016, the HLBC aimed to facilitate two-way agency-level engagement for “strategic cooperation between the parties and ongoing dialogue regarding areas of mutual interest in civil nuclear energy, including the civil nuclear fuel cycle” and initially focused on four working group areas of critical interest and cooperation: 1) spent fuel management, 2) promotion of nuclear exports and export controls cooperation, 3) assured fuel supply, and 4) nuclear security.⁵⁴ Steered by the working groups, the HLBC convened at the intersection of both nations’ diplomatic, technical, and regulatory expertise. Though the HLBC successfully convened in April 2016, January 2017, and August 2018, regular meetings soon ceased.⁵⁵ As industry tensions rose over the Westinghouse-KHNP intellectual property rights dispute, both U.S. and South Korean diplomatic capital turned toward seeking cooperative solutions to the corporate disagreement, which hampered progress on expanding U.S.-South Korean joint nuclear reactor export projects. The “prolonged hiatus” of the HLBC has remained a source of frustration for the South Korean government’s nuclear-focused agencies.⁵⁶

Moreover, the planned deadline for the ten-year Joint Fuel Cycle Study—launched in 2011—also quietly passed without large-scale public disclosure of its findings. According to the 123 Agreement, the study intended to explore the technical feasibility, economic viability, and nonproliferation acceptability of spent fuel management and disposition technologies, including reprocessing. Overall, the joint study was highly unique in form, requiring a specialized Technology Transfer Agreement (TTA) for cooperation between the U.S. Department of Energy’s Idaho National Laboratory (INL) and KAERI.⁵⁷ In 2021, South Korea’s Ministry of Science and ICT reported that the ten-year project’s findings were largely inconclusive regarding the feasibility of pyroprocessing and required further research.⁵⁸

Overall, the lack of perceived progress across these key pillars of the 123 Agreement has locked the U.S.-South Korean civil nuclear relationship in a looping cycle of frustration.⁵⁹ Apparent inaction on issue areas that South Korea increasingly views as points of national security interest—including nuclear fuel import dependencies and limitations in spent fuel waste storage—has caused strain on U.S.-South Korean civil nuclear cooperation. Conversely, U.S. policymakers’ thinking on the necessity of nonproliferation constraints has not changed, but rather been reinforced over the last decade.⁶⁰ While the argument for a return to the initially agreed-upon processes and frameworks—including restarting the HLBC—is reasonable, the possibility of receiving a different outcome to the brokered 2015 agreement on advance U.S. approval for ENR technologies at this time seems unlikely.

That being said, near-term prospects for industry-to-industry relations on these topics may be improving. U.S.-based commercial entities—driven in part by the revitalization of the U.S.

nuclear industry—are seeking to expand domestic uranium enrichment and, contrary to past U.S. thinking, launching commercial-level spent fuel recycling projects with U.S. government support.⁶¹ Further shifts in U.S. political and commercial thinking on spent fuel recycling could be on the horizon. On the sidelines of U.S.-South Korean diplomatic engagement, there may be opportunities for South Korea to have a stake in early-stage enterprises for traditional and advanced fuel production.

The process and potential outcomes from a current bilateral discussion over renegotiating the U.S.-South Korean civil nuclear cooperative framework remain uncertain. Despite this, there are clear pathways forward for the United States and South Korea to reestablish a more future-oriented and successful partnership.

U.S.-South Korean “Future-Oriented” Nuclear Partnership

As Washington and Seoul explore strategies to reaffirm and strengthen the existing—or, potentially, renewed—framework for the U.S.-South Korean partnership on civil nuclear energy, they should take into consideration several areas of near-term opportunity, including 1) AI-driven nuclear industry revitalization, 2) traditional and advanced nuclear fuel supplies, and 3) spent fuel management and long-term storage strategies.

AI-Driven Nuclear Energy Revitalization

Amid the U.S.-China race for global AI leadership, Washington is gradually positioning nuclear energy as a much-needed solution to providing a high-intensity, reliable energy supply for data centers. Increasingly, the U.S. government and large technology firms are exploring “civil nuclear energy to fill the critical gap in wattage for AI development” and deployment.⁶² As nuclear energy is reframed as essential for the U.S. national AI agenda, there are timely and important opportunities for the U.S.-South Korea nuclear partnership to play a critical role in the rising AI-nuclear nexus.⁶³

The Trump administration has explicitly emphasized the need for new nuclear reactors, either traditional large-scale or SMRs, to provide baseload energy for AI-related infrastructure.⁶⁴ To accomplish fast-paced nuclear reactor construction, the U.S. commercial nuclear industry will turn to trusted vendors to ensure a reliable supply chain for critical reactor components, including South Korean companies. For example, South Korean firm Doosan Enerbility has supplied major nuclear equipment, including steam generators, for the Vogtle nuclear power plant’s Westinghouse-designed AP-1000 reactor units 3 and 4—the United States’ most recent large-scale nuclear construction projects.⁶⁵ Similarly, Fermi America launched a cooperative partnership with Doosan Enerbility and Hyundai E&C to construct four AP-1000 reactors as part of the company’s planned 11 GWe Project Matador initiative in Amarillo, Texas, with construction planned for 2027.⁶⁶

Additionally, as more U.S. big tech companies, such as Amazon, Google, Meta, and Microsoft, target nuclear energy for on-the-grid or behind-the-meter energy solutions for data centers,

South Korean companies have a window of opportunity to participate in early-mover market engagement, particularly for first-of-a-kind SMRs and advanced nuclear fuel projects.⁶⁷ In August 2025, X-energy, Amazon, KHNP, and Doosan Enerbility signed a strategic collaboration agreement in support of the construction of generation-IV Xe-100 SMRs and TRISO-X fuel production in the United States.⁶⁸

Looking ahead, Washington and Seoul should continue to capitalize on near-term opportunities for new AI-driven nuclear initiatives, strengthening industry-to-industry partnerships. These are but a few examples of how South Korea's key public institutions and private firms—including KHNP, Doosan Enerbility, Hyundai E&C, and Samsung C&T—are actively contributing to the development of next-generation nuclear energy technologies in the United States.⁶⁹ Such trusted technology partnerships will be indispensable for ensuring the timely, on-budget buildup of the U.S. nuclear industry. For South Korea, early buy-in to U.S. nuclear projects can serve to reinforce South Korean companies' international position as globally trusted nuclear technology innovators.

Traditional and Advanced Nuclear Fuel Supplies

As the United States and South Korea target rapid, innovative timelines for growing their domestic nuclear fleets, while simultaneously eyeing openings for international nuclear export deals, the importance of long-term availability and reliability of supply for traditional nuclear fuels, including low-enriched uranium (LEU, LEU+), as well as advanced fuel types such as high-assay low-enriched uranium (HALEU), is ever more pressing.

Notably, South Korea, despite being the world's fifth-largest nuclear energy producer, does not operate industrial-scale facilities for uranium enrichment—a vital first step in nuclear fuel production.⁷⁰ Because of this, South Korea's reactor fleet depends entirely on imported enriched uranium. Previously, South Korea's dependency on imported LEU represented little concern, due to the wide availability of natural uranium and the nation's long-time export-import partnerships with key LEU suppliers. However, geopolitical challenges—triggered by Russia's invasion of Ukraine and the international community's efforts to move away from Russian-produced LEU—have caused South Korea to reevaluate its LEU import strategies.⁷¹ In 2024, the country imported roughly 1,209,340 kilograms of enriched uranium from major suppliers, including Russia (45 percent), Canada (17 percent), Australia (15 percent), and France (7 percent), among others.⁷² Since the United States enacted the Prohibiting Russian Uranium Imports Act on May 13, 2024, South Korea has started to shift the trajectory of its own LEU import plans, including by sourcing less from Russia.⁷³ In this context, South Korea is increasingly comparing its LEU import dependency to supply vulnerabilities associated with fossil fuel imports, leaving the nation potentially exposed to geopolitical risks and supply disruptions.⁷⁴

To address fuel cycle insecurities, the United States and South Korea should explore routes to advance commercial fuel supply assurances for both traditional and emerging nuclear fuel types. Already, steps are moving in the right direction. On February 4, 2025, Centrus Energy—one of the fastest-growing uranium enrichment companies in the United States—and KHNP signed a

ten-year purchasing contract for LEU shipments from Centrus Energy's American Centrifuge Plant in Piketon, Ohio.⁷⁵ Expanding the partnership, KHNP and POSCO International signed a non-binding memorandum of understanding (MOU) with Centrus Energy to explore investment opportunities to expand U.S. enrichment capabilities and to pursue additional purchasing agreements for LEU and HALEU.⁷⁶ Additionally, the U.S. Export-Import Bank's announcement to provide up to USD 1.8 billion to South Korean nuclear operators to purchase LEU from General Matters signals continued market opportunities for the U.S.-South Korea nuclear partnership.⁷⁷

Lastly, the Trump administration's reassessment of U.S.-based recycling of spent nuclear fuel is also leading to an uptick in public-private R&D, as well as interest and investment in commercial reprocessing in the United States.⁷⁸ With support from the U.S. Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) program, U.S. company Curio, in partnership with U.S. national laboratories, has completed laboratory-scale demonstrations of its NuCycle technology aimed at recycling spent nuclear fuel.⁷⁹ At the commercial level, Oklo announced plans in September 2025 to build a USD 1.68 billion commercial nuclear fuel recycling facility for operation by the early 2030s in Oak Ridge, Tennessee.⁸⁰ As the U.S. commercial sector continues to explore recycling projects, there may be opportunities for public-private engagement with South Korean industry, similar to existing LEU purchasing partnerships.

Moving forward, any revisions to the U.S.-South Korean 123 Agreement—and, potentially, by extension to the HLBC—will need to reconcile South Korea's legitimate priorities for energy resilience and industrial growth with longstanding U.S. commitments to nonproliferation leadership. Maintaining this balance will be critical for both parties to jointly advance nuclear energy industries that are secure, sustainable, and resistant to proliferation risks.

Spent Fuel Management and Long-Term Storage

As large-scale nuclear energy producers, the United States and South Korea have a vested interest in the safe, secure, and reliable long-term storage of spent nuclear fuel (SNF). Neither country possesses final storage solutions for SNF, relying on short-to-medium-term storage in reactor spent fuel pools (wet storage) or on onsite dry casks designed to contain radiation for several decades.⁸¹ As Seoul grapples with growing challenges in spent fuel management, Washington's extensive regulatory and technical expertise provides a strong basis for expanded collaboration.

Over the years, South Korea has increasingly sounded the alarm on the nation's dwindling capacity for SNF short- and long-term storage. In September 2025, the National Assembly received reports from KHNP that South Korea's oldest reactor plants, Kori and Hanbit, will reach storage capacity limits by the early 2030s.⁸² Based on reports, South Korea's stored SNF was estimated at approximately 19,110 metric tons (MT) of uranium across its five commercial nuclear power plants in 2024.⁸³ In the United States, approximately 95,000 MT of SNF are stored at seventy-nine licensed sites across the country; however, South Korea's limited landmass and smaller number of nuclear power plants create constraints on storage capacity, raising the urgency for near-term management and long-term disposal solutions.⁸⁴

In addition to commercial nuclear waste, South Korea's research and medical industries have produced a total of 137,864 drums (sized at 200 liters each) of radioactive waste.⁸⁵ Following the example of other nuclear-producing nations, South Korea established a low- and intermediate-level radioactive waste (LILW) disposal center, the Korea Radioactive Waste Agency (KORAD) in January 2009. Of the 137,864 drums of solid radioactive waste, only 32,475 drums as of March 2024 met the criteria for LILW and were transported to KORAD for permanent disposal.⁸⁶ Boasting a total capacity of 100,000 drums of LILW solid waste storage, KORAD addresses South Korea's LILW storage needs; however, the complex is not rated for high-level nuclear waste such as spent reactor fuel. On February 27, 2025, the National Assembly passed the High-Level Radioactive Waste Special Act to address the growing need for high-level waste storage.⁸⁷ The special act includes specified timelines for the construction and operation of an interim nuclear waste storage and permanent disposal storage facilities by 2050 and 2060, respectively.⁸⁸

As South Korea's commercial nuclear industry is under increasing pressure to find a solution to the waste storage problem, there is an opportunity for the United States and South Korea to develop and invest in near-term options. In 2015, Doosan, partnering with NAC International under a technology cooperation agreement, developed an SNF storage system for use in South Korea, and later became the first South Korean company to export dry casks to the United States in 2021.⁸⁹ Additionally, Orano TN (a U.S. subsidiary of a French-owned nuclear fuel cycle company), SeAH Besteel, and KEPCO Engineering & Construction signed an MOU for collaboration on the safe, secure management of South Korea's used nuclear fuel in dry storage.⁹⁰ Recently, KHNP selected Doosan Enerbility and NAC International to jointly design an indigenous dry cask storage system in South Korea, aiming for regulatory approval by 2027.⁹¹ Building on these industry-to-industry partnerships, the United States and South Korea can focus on near-term SNF management and storage solutions, targeting swift technology development and sector buildup to address South Korea's SNF capacity limitations.

Dual-Use Challenges on the Horizon

As mentioned above, the U.S.-South Korea nuclear partnership is facing new challenges in the form of overlapping agendas on the civil nuclear front and the newly introduced potential of South Korean-built SSNs. On November 13, 2025, the White House's Joint Fact Sheet gave "approval for the ROK to build nuclear-powered attack submarines."⁹² Even more interestingly, the statement specified that "The United States will work closely with the ROK to advance requirements for this shipbuilding project, including avenues to source fuel."⁹³ The injection of military-use nuclear technologies complicates the overall partnership—blurring the lines that were previously clearly delineated under the U.S.-South Korean civilian nuclear partnership.

For the Lee administration, the news was a welcome surprise, but one that produced more questions than answers. On the sidelines of APEC, Lee had requested U.S. support for acquiring nuclear fuel for submarines as part of South Korea's plans for a defense buildup to address North Korea's expanding weapons of mass destruction (WMD) program.⁹⁴ Trump's endorsement

of South Korea's independent pursuit of SSNs instead has raised questions in Washington and in Seoul over what this would mean in practice. Unlike the U.S. AUKUS Pillar I agreement with the United Kingdom and Australia, this would not be a technology transfer agreement for U.S.-built SSNs and the highly enriched uranium (HEU) fuel necessary for their operation.⁹⁵ Rather, this statement seems to indicate overarching approval for South Korea's independent pursuit of nuclear-propulsion submarines.⁹⁶ However, under the current U.S.-South Korean 123 Agreement, South Korea cannot pursue HEU fuel production, limiting future SSN designs to LEU or as yet untested HALEU fuel systems.⁹⁷ Furthermore, Trump's statement that South Korean SSNs would be built at the U.S. Philly Shipyard has raised additional concerns over the lead time necessary to upgrade the decades-old shipyard for SSN manufacturing.⁹⁸

Implementing the White House's statement may prove difficult legally, as the agreement would necessitate a completely new type of nuclear cooperation between the two countries. Under the 2015 123 Agreement, the United States and South Korea are limited to cooperating on peaceful uses of nuclear technologies. According to Article 13 of the agreement, "Nuclear material, moderator material, equipment and components transferred... shall not be used for a nuclear weapon or any nuclear explosive device, for research on or development of any nuclear explosive device, or for any military purpose."⁹⁹ As such, both countries would not be able to leverage the existing nuclear agreement for SSN development—even if South Korea were to pursue a French-style SSN design powered by LEU, as some in the Lee administration have suggested.¹⁰⁰

To move forward on SSN-related collaboration, the United States and South Korea will need to establish separate tracks for peaceful- versus military-use nuclear cooperation—each necessitating different political and legal frameworks.¹⁰¹ Depending on the nature of the joint SSN project, the United States would have to establish new technology and fuel transfer agreements, which could include discussions on U.S.-produced LEU, HEU, or even HALEU fuel as well as legal structures for the transfer of U.S.-produced materials and equipment. Beyond this, South Korea would also need to modify its IAEA Comprehensive Safeguards Agreement, adding the inclusion of an Article 14 provision for IAEA verification that nuclear material is not being diverted to a nuclear weapons program.

Overall, the recent U.S.-South Korean SSN discussions add another layer of complexity to the evolution of the nuclear partnership. Though not insurmountable, both nations should exercise caution moving forward, especially given how this development will relate to South Korea's preexisting political and legal obligations for civil nuclear cooperation.

Looking Down the Road

The United States and South Korea's recent refocusing on the bilateral 123 Agreement demonstrates the strategic importance—to both states—of the cooperative nuclear partnership. Over the past decade, the U.S.-South Korea nuclear partnership has continued to grow, capitalizing on critical opportunities of importance to both parties.

As U.S. and South Korean negotiators reenter conversations over areas of improvement for the 2015 123 Agreement, both sides should approach the issues with clear eyes, evaluating strengths in equal measure to perceived weaknesses. Restarting regular, high-level working groups—whether in the form of the HLBC or a newly designed official coordination body—should rank high on the agenda. Most importantly, future U.S.-South Korean bilateral consultations should incorporate public-private partnerships: to be successful, industry leaders should not be left out of the conversation. Additionally, there should be clarification regarding the timeline for the U.S.-South Korean Joint Fuel Cycle Study and the feasibility—politically, economically, and in terms of nonproliferation—of reprocessing technologies. Lessons from the United States’ recent uptick in private-sector leadership on spent fuel recycling technologies could feed into these discussions.

The pursuit of improvements, however, should not overshadow the foundational frameworks currently in place to strengthen the U.S.-South Korean nuclear cooperative partnership in the long run. Moreover, as the long-term political dimensions are readdressed, both sides should not overlook the near-term commercial successes and yet unexplored opportunities that lie ahead for the U.S.-South Korea nuclear partnership.

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