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AD ATOMUM PER ASPERA?

**Difficult Conditions for South Korean and
Japanese Nuclear Weapon Development**

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Executive Summary

East Asia's security environment has deteriorated, driven by Chinese and North Korean nuclear expansion and modernization, growing doubts about US extended deterrence, and lessons drawn from Russia's use of nuclear coercion during the Russia-Ukraine war. Against this backdrop, this report assesses the technical considerations, political conditions, and international constraints bearing on potential indigenous nuclear weapon development by Japan and South Korea, widely considered the most likely Asian states to proliferate.

Evaluating thirteen dimensions—including civil nuclear infrastructure, fissile material stockpiles, delivery systems, engineering expertise, strategic depth, budget, domestic political will, legal frameworks, and international risks—the report substantiates the common viewpoint that both Japan and South Korea could in principle develop nuclear weapons, but would face very challenging paths. Beyond this ultimate assessment, the report also reaches differentiated conclusions for each state regarding specific aspects of potential nuclear proliferation.

Japan emerges as the stronger case technically, and is indeed already a threshold nuclear power. Uniquely among non-nuclear signatories to the Nuclear Nonproliferation Treaty (NPT), Japan possesses both uranium enrichment facilities and spent nuclear fuel reprocessing capabilities, along with separated plutonium and a large reactor fleet. The primary constraints

on Japanese nuclear armament are political and alliance-based, not technical. As an additional obstacle, Japanese delivery systems for hypothetical nuclear weapons lag behind peer states, although Japan is growing its conventional offensive attack systems in a way that would close the gap.

South Korea is an advanced latent nuclear power trending toward threshold status. It operates 26 nuclear reactors—including heavy-water reactors capable of efficiently producing weapons-grade plutonium and tritium—and has world-class delivery systems and military infrastructure. Public support for nuclear weapons has reached 70–75%, political debate has intensified, and ongoing US-South Korea negotiations over enrichment and reprocessing rights could significantly narrow the remaining technical gap.

Both states face major jurisprudential and international obstacles, including domestic laws, NPT commitments, US legal restrictions, severe economic risks associated with sanctions, and possible preventive attack by adversaries.

The report concludes with policy recommendations for Europe, urging reinforcement of the NPT regime, deeper engagement with East Asian partners on nonproliferation and crisis management, and support for US alliance credibility as the most effective long-term barriers to regional proliferation.

Introduction: Background

The East Asian security environment has deteriorated over the last decade. In parallel with a dysfunctional global order fraught with wars and their spillover effects, East Asian security has degraded as risk for kinetic conflict has grown due to major military build-ups, weakened inter-state trust, and fraying deterrence in the region (*Freyman and Halem 2025; Cronin 2026*). The effect of this general dynamic has been notably present in the particular cases of South Korean and Japanese concern about the hostile strategic intent and capabilities of neighboring adversaries, coupled with growing skepticism about the reliability and credibility of US security and defense commitments to allies and partners (*Garlauskas and Gilbert 2025; Gwadera 2025; Mori 2026*). Both states perceive weakening deterrence of China and North Korea (abetted by Russia) coupled with uncertain US reassurance due to president Donald Trump's questionable commitment to alliances in general and, in specific, Washington's seeming weakness in effectively strategically prioritizing the Asia-Pacific (e.g., disproportionate focus on Central/South America, as well as the 2026 war against Iran).

Indeed, these two issues are related: perception of weakened deterrence contributes to undermined reassurance, while undermined reassurance signals to Beijing, Pyongyang, and Moscow potential opportunities for revisionist, destabilizing behavior.

The nuclear threat dimension of this is particularly critical. North Korean and Chinese expansion and modernization of their nuclear arsenals have challenged US extended nuclear deterrence for East Asian allies and partners (*Santoro 2025; Acton and Panda 2026; Cronin 2026; Salisbury 2026*). North Korea's nuclear arsenal is currently assessed at 50-60 assembled nuclear warheads, demonstrating substantial growth in recent years (*CRS 2026; SIPRI 2026*). North Korea is further believed to have enough weapons-grade fissile material for up to 90 warheads, and North Korean leader Kim Jong Un has called for "exponential" growth in Pyongyang's nuclear arsenal (*CRS 2026; Lendon et al 2026*). Assessment of the veracity of intended growth has been supported by open-source intelligence indicating ongoing spent nuclear fuel reprocessing and uranium enrichment activities (including at a possible third uranium enrichment facility at Kusong, in addition to known sites at Yongbyon and Kangson) (*Burkhard et al 2025; Lendon et al 2026*). Moreover, in spring 2026 Kim Jong Un claimed that the state has more than doubled its capacity to produce weapons-grade nuclear material over the past five years (*Lendon et al 2026*). Finally, Pyongyang has scaled up the number, diversity, and quality of its delivery systems and platforms (notably ballistic missiles of all ranges, cruise missiles, and nuclear weapon capable surface ships and submarines), and apparently made legal changes to lock-in nuclear weapons

status (domestically and internationally), secure command-and-control, and prepare for a strategy of nuclear coercion (*Kang 2026; Van Diepen 2026*).

A mature, de jure nuclear power that has traditionally been associated with a minimal deterrent (~200-250 warheads) and a “no first use” policy, China’s arsenal has recently grown and is currently estimated at 620 nuclear warheads (making it the world’s third-largest nuclear weapon power) (*SIPRI 2026*). This period of apparent arsenal build-up is ongoing, with SIPRI reporting in 2025 that China was adding approximately 100 new warheads per year (*Ibid.*). The US government has claimed that China will have over 1,000 operational warheads by 2030 and may continue growing its modernized arsenal to 1,500 warheads by 2035 (*Kuramitsu 2025*). Beijing also continues to develop more capable delivery systems for all three components of the nuclear triad, and there is ongoing debate among nuclear and China experts as to whether Beijing is shifting its nuclear doctrine and posture away from minimal deterrence and toward a more coercive strategy (*Cheng 2025; UCESRC 2025*).

Meanwhile, combining the “stability-instability paradox” with crisis instability, Russia’s nuclear threats in the context of the Russia-Ukraine war have demonstrated the utility of using nuclear weapons as a coercive tool to blunt or preclude conventional intervention by third parties out of fear of potential conventional -> nuclear escalation.

When combined with weakened reassurance regarding US reliability in upholding its security and defense commitments, this complex of issues has led South Korea and Japan to question the likelihood that the US would risk Los Angeles to deter major (especially nuclear) attack against Busan or Osaka by China or North Korea (*Asan 2025; Asan 2025a; Isoda 2025*).

A noticeable effect of this has been increased reflection and debate by international experts about South Korean and Japanese possibilities for progressing on the pathway toward indigenous nuclear armament (*Kim 2024; Kausikan 2025; Dalton 2026*). This debate has also occurred—secretly and sometimes openly—in South Korea and Japan. South Korea is the more obvious of the two cases, as public opinion (~70%-75%), expert belief, and senior official discourse have markedly shifted to possible support for indigenous nuclear weapons (*Park 2017; Choe 2023; Richey 2023; Asan 2025; Asan 2025a; Jo 2026*).

Japan is already a threshold nuclear weapon power, likely able to produce nuclear weapons within 6-36 months¹, and its nuclear weapons debate reflects that status through a muddled lack of urgency (*US National Intelligence Estimate 1967; Sneider 2026*). Japanese public opinion remains opposed (~60%) to nuclear weapon possession, yet widespread doubt (77%) that the US would protect Japan in the event of a military threat has started to shift the political debate (even

among major political figures, including LDP heavyweight Taro Kono and defense minister Shinjiro Koizumi) toward willingness to conditionally consider nuclear armament (*Kelly and Geddie 2025; Kelly and Geddie 2025a; Kelly et al 2025; Japan Times 2026; Japan Times 2026a*).

But political intent and will—although necessary—are not sufficient for nuclear proliferation. The objective capacity—defense-industrial, military, geographic, scientific and technological, human resources, budgetary, and resilience to external pressure—to build the capability is also fundamental. In this vein, this report, based on extensive research of publicly available (including government) documentation, combines a layman’s overview of the requisite technical nuclear development elements with analysis of the political and international relations conditions under which South Korea and/or Japan could conceivably decide to construct a nuclear weapons program. The technical capability assessments do not indicate that South Korea or Japan have reached a decision to proliferate nuclear weapons, but serve rather as a defense-industrial and military-engineering capability baseline for hypothetical proliferation.

In this context, section I evaluates South Korean and Japanese defense-industrial capacities and capabilities to complete a nuclear weapon development program, if the states ever made the political decision to proliferate. Factors for civil nuclear capacity, warhead production capability, and weaponization potential are assessed. These factors indicate a spectrum of difficulty ranging from trivial to significant. Section II looks at international and domestic political and legal conditions in the context of which would have to be made a decision to develop a nuclear weapons program in South Korea and Japan. These conditions are, for the moment, still prohibitive, albeit seemingly eroding. Section III analytically combines the information from sections I and II into a synthesis of the ability for South Korea and Japan to develop nuclear weapons over a given time frame, and in the context of a given threat profile from China and North Korea. The ultimate composite view of this paper is that Japan is and remains a threshold nuclear power, while South Korea is—through a variety of mechanisms—potentially on the path to advance from a latent nuclear power to a threshold nuclear power. Section IV concludes with reflections about the nonproliferation policy implications of the foregoing.

I. South Korean and Japanese Defense-Industrial Capacities and Capabilities for Nuclear Weapon Development

South Korea and Japan are highly advanced states with top-line heavy industry and cutting-edge manufacturing sectors. They have world-class scientific and technological resources—including human resources—and excellent research and design ecosystems. South Korea and Japan in principle have the necessary technical and infrastructural prerequisites to develop nuclear warheads. However, to varying degrees they face constraints in producing and/or acquiring the necessary fissile material (especially weapons-grade uranium-235 and plutonium-239), fusion products (lithium-6, deuterium, tritium), and critical minerals (beryllium, gallium, etc.). Beyond warhead production, fielding nuclear weapons also requires weaponization. This includes delivery systems, military engineering, technology for arsenal management and command and control, strategic depth for weapons testing/basing/storage and deployment, and budget availability. In this regard also, South Korea and Japan have varying levels of capacity and capability.

This section examines each of these areas, with the aim of assessing² the South Korean and Japanese defense-industrial capacity and capability to develop and field weaponized nuclear warheads. The section is divided into two parts. Part A is an accounting of both states' civil nuclear ca-

capacity—notably fissile material potential—and capabilities for warhead production. Part B describes South Korean and Japanese prospects for nuclear weaponization.

A. Civil Nuclear Capacity and Warhead Production Capability

(i) Civil nuclear capacity

A civil nuclear program is not strictly necessary for developing nuclear weapons, but it provides advantages that make the path considerably easier. The primary advantages are technical infrastructure/expertise and a foundation for production of fissile material (especially weapons-grade uranium (U-235) and plutonium (Pu-239)).

Civilian nuclear reactors and research facilities require various scientists and technical experts—physicists, radiochemists, metallurgists and materials scientists, engineers, electrical technicians, etc.—with expertise in nuclear and reactor physics, nuclear fuel, radiation handling, materials science, and other domains applicable to work on nuclear weapons. As for fissile material production, most nuclear power reactors use U-235 in fuel rod assemblies, and the uranium centrifuge technology for producing low-enriched forms of this reactor fuel can be employed to produce highly-enriched uranium (HEU) suitable for

nuclear warheads. Nuclear power reactors also produce plutonium (Pu-239, Pu-240) as a byproduct in spent nuclear fuel. This spent fuel can be reprocessed to allow the extraction of weapons-grade plutonium (Pu-239) used in modern nuclear warhead designs (or reactor-grade Pu-240 for cruder warheads).

South Korea and Japan both have a large civil nuclear industry with dozens of operating/operable nuclear reactors. Both the inputs (reactor fuel with U-235 and/or U-238) and outputs (spent nuclear fuel containing potentially extractable Pu-239 or Pu-240) of South Korean and Japanese nuclear reactor fleets provide a potential civil nuclear industrial base for making fissile material for nuclear weapons.

(ia) South Korea currently has 26 commercially operating/operable nuclear power reactors (~25,000MWe), 2 decommissioned reactors, and 4 under construction (WNA 2026c). 23 of South Korea's nuclear reactors are light-water (PWR using low-enriched U-235³) that, under normal operating conditions, produce spent fuel with high content of reactor-grade plutonium (Pu-240) that can be chemically reprocessed (e.g., PUREX) for extraction. However, the Pu-240 isotope is suboptimal for nuclear warheads, since it is inefficient (low yield), inconvenient (presenting heat generation and radiological safety issues), and potentially unreliable (subject to pre-initiation "fizzling") (US Dept. of Energy 1997). A crude Pu-240 warhead could be

improved with fission-boosting (e.g., tritium-deuterium gas introduction), but this is also suboptimal (NPEC 2021).

While it is not technically impossible to perform isotopic separation of weapons-grade Pu-239 from Pu-240, it is extremely complex, difficult, expensive, and impractical. Instead, creating Pu-239 from civil⁴ nuclear power reactors would require irradiating LEU in fuel rods for a short period (several months) to achieve low "burn-up," with the resultant spent fuel containing high content (+93%) of Pu-239 that can be extracted through chemical reprocessing. However, operating LWRs with low burn-up (e.g., for nuclear warhead purposes) is inefficient for nuclear energy production and easily detectable by the international community (Zubair et al 2024).

In addition to LWRs, South Korea also operates 3 heavy-water (CANDU PHWR) nuclear reactors that both more efficiently produce Pu-239 (if deliberately operated that way) than LWRs and use natural rather than enriched uranium (WNA 2026c). CANDU reactors offer two additional advantages for nuclear weapon proliferation: they can be refueled while operating (making detection of the reactors' operating conditions and potential fissile material production/diversion more difficult), and irradiated heavy-water produces tritium (useable for fission-boosting) as a byproduct (Whitlock and Lee 2009). As with LWRs, extracting plutonium from CANDU spent fuel requires reprocessing.

Assuming that a typical 1,000Mwe reactor produces 200~250kg per year of plutonium in spent fuel, South Korea's 26 nuclear reactor fleet could theoretically generate 5-7 tons of separable plutonium (Pu-239, Pu-240) annually (WNA 2026a). Although achieving this would require extensive industrial-scale reprocessing—*technology that South Korea does not currently possess, but is under negotiation with the US*—in principle (and subject to throughput) South Korea could support dozens or even hundreds of warheads per year, assuming 4-12kg of plutonium per warhead (depending on warhead design and whether the plutonium is weapons- or reactor-grade) (*Ibid.*).

As for the uranium pathway to fissile material, South Korea does not currently have any enrichment capability; instead, it purchases low-enriched uranium (~3-5% LEU) from the international market (Russia, Canada, US, Australia, France) (WNA 2026c). If, however, South Korea were to develop enrichment capability—for example, as an outcome of ongoing negotiations with the US to this end—and start fabricating commercial reactor uranium oxide fuel on this basis, the necessary industrial scale-up could provide a potential margin for diverting some enrichment⁵ away from LEU toward highly enriched uranium (+90% HEU) at sufficient quantities for nuclear warhead development.

Potential for nuclear weapon proliferation: Medium

(iβ) Japan currently has 33 commercially operating/operable nuclear reactors (~31,679MWe), 21 reactors shut down or decommissioned, and 2 under construction (WNA 2026). Japan's nuclear reactors are all light-water (PWR or BWR). Under normal operation conditions, Japan's nuclear reactor fleet produces spent fuel with high content of reactor-grade plutonium (Pu-240). Production of weapons-grade Pu-239 would require operating reactors in a mode targeting nuclear weapon development. Japan does not operate heavy-water reactors, having decommissioned its prototype Advanced Thermal Reactor (WNA 2026).

However, the Japanese HWR reactor disadvantage (*vis-à-vis* South Korea) with respect to relatively more efficient Pu-239 production is more than compensated for by Japan's full mastery of the closed nuclear fuel cycle (WNA 2026d). Embarking on a policy of maximizing nuclear fuel independence since the 1950s, Japan is unique⁶ among non-nuclear weapon state adherents to the Nuclear Nonproliferation Treaty in having (publicly declared) uranium enrichment and spent nuclear fuel reprocessing capabilities. This means Japan masters both the front and back ends of the nuclear fuel cycle.

On the front end, it can fabricate its own uranium fuel via enrichment at its Rokkasho enrichment facility featuring 7 gas centrifuge cascades with

150,000SWU/yr (*Ibid.*).⁷ Currently Japan's enrichment facilities are intended to produce LEU, but at 150,000SWU/yr, it would be capable of producing ~650kg of HEU annually, an amount more than sufficient for a nuclear weapon program (~15-25 HEU warheads). One potential constraint, however, is that Japan uses imported natural uranium for domestic enrichment and contracts much of its uranium enrichment to French company Orano (*Ibid.*).

On the back end, in addition to reprocessing of spent fuel outsourced to Europe (France and the UK), Japan operated a now-closed reprocessing facility at Tokai and is bringing online (in 2027) a reprocessing facility at Rokkasho (*Ibid.*). The Tokai and Rokkasho reprocessing facilities were/are set up to produce uranium-plutonium mixed oxide (MOX) fuel, which is suboptimal for diverting extracted plutonium for nuclear warhead pit production (*Ibid.*). Nonetheless, assuming that a typical 1,000MWe reactor produces 200~250kg per year of plutonium in spent fuel, Japan's 33 nuclear reactor fleet could theoretically generate 6-8 tons of plutonium annually (the output amount for which the Rokkasho reprocessing plant is designed). Although this would require reprocessing to extract reactor-grade Pu-240 and/or weapons-grade Pu-239, in principle (and subject to throughput) Japan could support dozens or even hundreds of warheads per year, assuming 4-12kg of plutonium per warhead (depending on warhead design and whether the plutonium is weapons- or reactor-grade).

Potential for nuclear weapon proliferation: High

(ii) Separated plutonium stockpile

In the context of a nuclear weapon program, a civil nuclear industry is about expertise and a continuous, forward-looking, long-term foundation for a full spectrum of necessary materials (especially fissile materials) and technologies. But another set of fissile material resources is relevant: accumulated stocks of separated/separable plutonium. Existing separated/separable plutonium stockpiles potentially shorten the pathway to nuclear weapons and provide for nuclear weapon program robustness, since this fissile material is easier to hide and protect (if proliferation is done clandestinely) than easily observable industrial-scale civil nuclear sites.

Currently South Korea does not have publicly declared separated plutonium stockpiles. It does have a significant amount of spent nuclear fuel, but no reprocessing capability. Japan currently has about 44 tons of separated plutonium, of which 8.6 tons is stored in-country.

(iia) South Korea possesses ~15,000-20,000 tons of high-level spent fuel from its light- and heavy-water reactors, and it continues to produce an additional 700 tons per year (WNA 2026c). South Korea's LWRs store spent fuel in on-site cooling pools, while HWR spent fuel is both in cooling pools and dry cask storage. South Korea is not currently believed to possess

any already separated plutonium, but the unseparated stockpiles of spent fuel could in principle be diverted to nuclear weapon production.

Doing so, however, would present several major obstacles. First, South Korea does not currently possess any spent fuel reprocessing (PUREX or pyroprocessing) capabilities for extracting plutonium, much less at industrial-scale (*Ibid.*). South Korea is negotiating with the US to obtain the right to establish reprocessing, but the prospects for this development are uncertain (in part because the current US-South Korea 123 Agreement prevents that course) (*Ibid.*). Second, current publicly available information does not indicate that South Korea has operated any nuclear reactors in a mode (short irradiation period with low burn-up) that would allow for spent fuel to contain sufficient levels (+93%) of weapons-grade Pu-239. Rather, South Korea's accumulated spent fuel is exclusively reactor-grade (with high quantities of Pu-240) suboptimal for nuclear warhead pits.

Nevertheless, despite those obstacles, the volume of high-level spent nuclear fuel in South Korea would be *theoretically* sufficient to provide reactor-grade plutonium for ~14,500 nuclear warheads (depending on warhead design and assuming 12kg of plutonium per warhead, to account for the high ratio of Pu-240).⁸ Were South Korea to decide to develop nuclear warheads on this fissile material basis, the extent to which it could manufacture them would depend on reprocessing throughput and the ability to work with fissile material with

a high admixture of Pu-240. This would likely mean a modest warhead output.

Potential for nuclear weapon proliferation: Medium/Low

(iiβ) Japan currently holds ~20,000 tons of high-level spent nuclear fuel, and it continues to produce 800-1,000 tons annually (WNA 2026; WNA 2026d). Most spent fuel is stored in on-site cooling pools and dry casks, with some in intermediate storage off-site. Like South Korea, there is no publicly available evidence indicating that Japan has operated any nuclear reactors in a mode (short irradiation period with low burn-up) that would allow for spent fuel to contain sufficient levels (+93%) of weapons-grade Pu-239. Rather, Japan's spent nuclear fuel stockpile is exclusively reactor-grade (with high quantities of Pu-240) suboptimal for nuclear warhead pits. In contrast to South Korea, however, Japan has reprocessing capabilities, which it has already employed to separate 44.4 tons of reactor-grade plutonium (with high quantities of Pu-240) (*Ibid.*). Of this, 8.6 tons is stored in Japan, with the remainder stored in France and the UK (*Ibid.*).

Both the unprocessed spent nuclear fuel and separated plutonium stockpiles in Japan would provide it with a feasible pathway to fissile material for nuclear warheads. The ~20,000 tons of unseparated spent fuel could theoretically be reprocessed into reactor-grade plutonium sufficient for ~15,000 nuclear warheads (depending on warhead design, and assuming 12kg of plutonium per warhead, to

account for the high ratio of Pu-240). Were Japan to decide to develop nuclear warheads on this basis, the extent to which it could manufacture them would depend on reprocessing throughput and the ability to work with fissile material with a high admixture of Pu-240. This would likely mean a modest warhead output. Japan's fastest pathway to a plutonium-based nuclear warhead would likely involve the use of the 8.6 tons of already separated reactor-grade plutonium still stored in Japan. This would be a quantity sufficient to produce ~700 nuclear warheads (depending on warhead design, and assuming 12kg of plutonium per warhead, to account for the high ratio of Pu-240).

Potential for nuclear weapon proliferation: High

(iii) Enriched uranium stockpile

Like already separated plutonium, stockpiles of enriched uranium⁹ shorten the pathway to nuclear weapons and provide for nuclear weapon program robustness, since this source of fissile material is easier to hide and protect than easily observable industrial-scale civil nuclear sites. Currently South Korea has no publicly declared enriched uranium stockpiles, especially HEU (WNA 2026c). Japan has a quantity of stockpiled LEU for its civil nuclear power reactors (WNA 2026d). South Korea also has no enrichment facilities, and is prohibited from enrichment by a US 123 Agreement (WNA 2026c). Japan operates enrichment facilities, but no longer possesses significant quantities of HEU

(much of it having been sent to the US as part of nonproliferation efforts), but at one point it had significant quantities of HEU (used in civilian research reactors) (US Department of Energy 2024). Japan imports its natural uranium.

(iiiα) South Korea has no enriched uranium stockpile and no enrichment facilities, although it is negotiating with the US to acquire this right despite a current US 123 Agreement (WNA 2026c). South Korea has some reserves of natural uranium ore, but it is low-quality and un-economical. Consequently, South Korea imports natural uranium for its HWRs. Since it cannot enrich uranium, South Korea imports LEU for its LWRs. South Korea also does not possess depleted uranium, which is a (non-fissile) enrichment byproduct used in some nuclear weapons.

Potential for nuclear weapon proliferation: Low

(iiiβ) Japan has no HEU stockpile, but does have an LEU stockpile for its commercial nuclear reactors (WNA 2026; WNA 2026d). This stockpile could potentially be further enriched to weapons-grade HEU. Like South Korea, Japan has some reserves of natural uranium ore, but it is low-quality and un-economical. Consequently, Japan imports natural uranium for indigenous LEU production for its LWRs. Japan possesses ~16,000 tons of depleted uranium, which could be used in modern nuclear weapons (WNN 2025).

Potential for nuclear weapon proliferation: High

(iv) Tritium availability

Tritium is an important radioactive hydrogen isotope with several uses in nuclear weapons. In “boosted fission”¹⁰ designs, tritium is combined with deuterium (used in HWRs) in a gas injected into the warhead pit in order to increase yield (or achieve a given yield with lower warhead weight). Tritium is also used in neutron initiators that have an important role in starting the necessary critical chain reaction in the warhead core. Tritium is produced from lithium-6 irradiation or as a byproduct of HWRs. Tritium decays every 12.3 years, so modern nuclear weapon powers require technology to replenish tritium.

(iv α) South Korea has a roughly 8-10kg tritium stockpile and the technological means to produce more (~500g annually) (Son et al 2009). One option would be to refine domestically mineable, naturally occurring lithium-7 into lithium-6 for tritium production, but the simpler (current) means to tritium production is to extract it from South Korea’s HWRs.

Potential for nuclear weapon proliferation: High/Medium

(iv β) Japan has a huge stockpile of tritiated water stored at the Fukushima nuclear power station, but the tritium is very difficult to separate from the water. Japan has small amounts for research and the technological means to produce more through

the lithium-6 pathway in LWRs (US Department of Energy 2016).

Potential for nuclear weapon proliferation: High/Medium

(v) Non-fissile material supply chain

Beyond fissile materials, nuclear warhead supply chains involve many other material, industrial, electronic, and specialty inputs. A partial list includes high-performance supercomputers; precision machine tools; maraging steel, aluminum, titanium, carbon composites, gold, platinum, gallium, high-purity beryllium, polonium, lithium, aerogel; high-explosives; thermal insulators; various alloys, seals, coatings, magnets, bearings, pumps, vacuums, and rotors; detonators (especially EBW), lenses, reflectors, fuzes, sensors, and cameras and diagnostic instruments. As South Korea and Japan are each highly industrialized, advanced economies, they already have many such products or the capability to develop them domestically or source them internationally. An effort to develop nuclear warheads would doubtless face many supply chain challenges, but South Korea and Japan are probably capable of meeting non-fissile material supply chain requirements.

Potential for nuclear weapon proliferation: High/Medium (South Korea)

Potential for nuclear weapon proliferation: High/Medium (Japan)

(vi) Engineering/Physics/Computing Expertise and Capability

South Korea and Japan are highly advanced industrial economies with world-class high-tech manufacturing, notably in semiconductors. The basis for this is not only physical infrastructure, but also engineering expertise that would be necessary for a nuclear weapon program. South Korea and Japan are both top 10 in the total number of engineers (also with high per capita figures). As for STEM in general and nuclear physicists in particular (both proxies for the scientific base necessary for nuclear weapons), South Korea is a top 7 producer of STEM graduates, while the Korea Nuclear Society has ~1,500 nuclear physicists and scientists as members (*International Energy Agency 2025; Korea Nuclear Society 2026; Mani 2026*). Japan is top 5 in STEM graduates, while the Atomic Energy Society of Japan has over 6,000 members (*Atomic Energy Society of Japan 2026; Mani 2026*).

Computing power is also critical for modern nuclear warhead design, and South Korea and Japan are both global leaders in high-performance computing (especially supercomputers). South Korea is ranked 10 in this category, while Japan is ranked 2 (*Lu 2024*).

Potential for nuclear weapon proliferation: High (South Korea)

Potential for nuclear weapon proliferation: High (Japan)

B. Nuclear Weaponization Capacity and Capability

(vii) Delivery systems

Building compact, reliable nuclear warheads is a major industrial and scientific challenge, but it is only one step in the process of nuclear weaponization. Achieving the status of nuclear weapon power requires developing delivery systems to which a warhead can be mated. The contemporary gold standard for nuclear weapons is the “triad” consisting of land-based (siloed or mobile), air-launched (from fighter or bomber aircraft), and submarine-launched ballistic missiles, cruise missiles, gravity bombs, and/or exotics (e.g., HGVs). Each type of delivery system has advantages and disadvantages in terms of promptness and combat readiness, ease/security of command-and-control, firepower and range, flexibility, survivability, and cost. For Seoul and Tokyo to achieve primary nuclear deterrence and warfighting capability does not immediately require a full triad. Having a functional nuclear weapon arsenal of limited size and even one delivery method would qualify, although most states over time opt to have at least two elements of the triad.

(viii) South Korea has a large, highly advanced military (supported by a large, sophisticated arms industry) already capable of a full (triad) range of delivery systems that could (with feasible modifications) meet the requirements for launching nuclear weapons (*Global Firepower 2026*). Notably, South Korea has large-payload,

land-based ballistic (SRBMs/MRBMs) and cruise missiles, ballistic missile submarines (also with cruise missile capability), and fighter aircraft (including the partially indigenous KF-21) that could deliver air-launched gravity bombs or cruise missiles (MND 2022). South Korea does not have strategic bombers. These systems would be sufficient to range all of North Korea and parts of China. Although South Korea does not currently have IRBMs¹¹ or ICBMs, it is capable of developing them.

Potential for nuclear weapon proliferation: High

(viiβ) Japan has a large, highly advanced Self-Defense Force (supported by a large, sophisticated arms industry), but for political reasons historically has chosen to restrict its offensive capabilities (*Global Firepower 2026a*). Given increased perceived threats from China (and continued risk from North Korea), Japan is currently shifting its defense focus toward a more standard (less defensive) posture, including building out a capable set of counterstrike and stand-off capabilities, but at the moment Japan does not possess traditional surface-to-surface SRBMs/MRBMs/IRBMs/ICBMs, although it does operate US Tomahawk cruise missiles that could theoretically be retrofitted to carry nuclear-warheads (*Kawai 2026*). Japan's space launch and overall scientific expertise probably make it capable of producing long-range ballistic missiles over a short/medium timeline. Japan also has no ballistic missile submarines, but does have a large, high-quality submarine construc-

tion industry that could theoretically build ballistic missile submarines over a medium timeline. Japan's air force has several strike aircraft—notably the US-made F-35 and domestically manufactured Mitsubishi F-2—that use various conventional ground-attack missiles and bombs. These aircraft could theoretically be retrofitted to deliver nuclear weapons. Japan does not have strategic bombers.

Potential for nuclear weapon proliferation: Medium

(viii) Military control and engineering technology

States that develop nuclear weapons also must ensure that the arsenal is properly managed and deployed/employed. Nuclear safety and readiness demand that a nuclear arsenal be adequately stored and maintained. Nuclear security and control require that states master the “always/never” problem—nuclear weapons are *always* to be used when a legitimately authorized nuclear order has been given, and *never* used without a legitimately authorized nuclear order. Effective deployment/employment of nuclear weapons thus requires high-functioning C4ISR capabilities (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance).

(viiiα) South Korea already has a high-functioning military with a culture of respect for military discipline and chain of command, as well as a highly securitized nuclear power industry (*Kim 2025*). There is little doubt

that South Korea can manage a nuclear arsenal, despite a history of occasionally turbulent civil-military relations (including military coup d'état). South Korea's military is also technologically sophisticated, with C4ISR capabilities (including satellites, sensing, etc.) sufficient to deploy/employ a nuclear arsenal.

Potential for nuclear weapon proliferation: High/Medium

(viiiβ) Japan already has a high-functioning Self-Defense Force with a culture of respect for military discipline and chain of command, as well as a highly securitized nuclear power industry (*Schwenke 2020*). There is little doubt that Japan can manage a nuclear arsenal. Japan's Self-Defense Force is also technologically sophisticated, with C4ISR capabilities (including satellites, sensing, etc.) sufficient to deploy/employ a nuclear arsenal.

Potential for nuclear weapon proliferation: High

(ix) Strategic depth

Developing and fielding a nuclear arsenal necessitates warhead testing¹² locations (most likely underground) as well as hardened basing/storage facilities. Beyond the issue of physically achieving these capabilities, geographically small or dense states may face political difficulties—e.g., populations near testing and basing/storage facilities may protest. The character of the operational environment is also a permissive or complicating factor in deploying

nuclear weapons. Compressed operational environments with short distances to adversaries, heavy urban land use, challenging terrain, and little “rear” area present decision-making (timeline) and survivability challenges to states desiring nuclear weapons.

(ixα) South Korea has limited strategic depth for a nuclear weapon power. Its small size and proximity to its primary adversary (nuclear-armed North Korea) mean it has a compressed operational environment with little “rear” area (all of South Korea is within North Korean ballistic missile range), trackable terrain (a currently manageable problem considering North Korea's weak surveillance capabilities), short reaction and decision-making times, and potential decapitation and command-and-control vulnerability (*Global Firepower 2026*). Much of South Korea's airspace is in range of North Korean air defenses, limiting the ability of strategic aircraft to loiter. Combined, this leads to a greater crisis instability (“use it or lose it”) problem, especially in the absence of a survivable second-strike capability (*Hiim and Bowers 2025*). Moreover, South Korea's small geographic size and dense urban development would also potentially mean limited options for (presumably underground) testing facilities, basing, and storage for nuclear weapons (*Asan 2025a*). However, South Korea's mountainous terrain, easy ability to field mobile launchers, and engineering capacity to harden/bury bases and other facilities would allow for nuclear weapon mobility/concealment that would help with survivability.

**Potential for nuclear weapon
proliferation: Medium**

(ixβ) Japan's strategic depth is meaningfully better than that of South Korea. Japan's relatively expansive geography and archipelagic elongation provide it with a sizeable operational environment and "rear" area (*Global Firepower 2026a*). Reaction and decision-making times (e.g., in the case of attack by China) would be relatively short (especially for major urban areas targeted with ballistic missiles from China's east coast), but longer than those of South Korea and less acute in terms of potential decapitation and command-and-control vulnerability. Thus, Japan would face a manageable crisis instability ("use it or lose it") problem, even in the absence of a survivable second-strike capability. Like South Korea, Japan's heavy urban development would also potentially mean limited options for (presumably underground) testing facilities, basing, and storage for nuclear weapons. However, also like South Korea, Japan's mountainous terrain, easy ability to field mobile launchers, and engineering capacity to harden/bury bases and other facilities would allow for nuclear weapon mobility/concealment that would help with survivability.

**Potential for nuclear weapon
proliferation: High/Medium**

(x) Budget

Nuclear weapons are expensive to develop, field, and maintain, with high up-front

costs, recurrent budget commitments, and a long tail of strategically locked-in spending. States wanting nuclear weapons thus need short-/medium-term budgetary space, as well as a long-term financial strategy. They also inevitably face the prospect of a trade-off between conventional defense spending and nuclear weapon outlays.

(xa) In principle, South Korea has budgetary room to develop nuclear weapons, even assuming a worst-case nominal cost of \$30 billion (over an initial multi-year period). South Korea's annual GDP is ~\$2 trillion, and the central/general government debt-to-GDP ratio is only ~50-55% (low by advanced economy standards), allowing significant margin for deficit spending (*Global Firepower 2026; World Population Review 2026*). In reality, however, a South Korean nuclear weapon program (especially over the long-term) would require difficult budgetary trade-offs, since the debt-to-GDP ratio is already rising rapidly, GDP growth is moderate, and any nuclear-related sanctions or significant trade disruptions would negatively impact government revenue. With a current annual defense budget of \$45 billion, a South Korean nuclear weapon program would likely require reduced investment in conventional defense spending, increased taxes to generate additional revenue, and/or deficit spending. The long-term sustainability of such a strategy would depend on political will (*Hecker 2023*).

**Potential for nuclear weapon
proliferation: High/Medium**

(xβ) Japan has budget space to develop nuclear weapons, especially with lower upfront costs (~\$5 billion) than South Korea due to Japan's existing enrichment and reprocessing facilities. Japan's economy (\$4.6 trillion) is the world's third-largest, and, even with a super-elevated central/general government debt-to-GDP ratio (220%), Japan has resources for financing a nuclear weapon program (*Easton 2018; Global Firepower 2026a; World Population Review 2026*). Like South Korea, however, in the long-term a Japanese nuclear weapon program would require difficult budget-

ary and defense priority trade-offs. With a current annual defense budget of ~\$60 billion, a Japanese nuclear weapon program would likely require reduced investment in conventional defense spending, increased taxes to generate additional revenue, and/or deficit spending. The long-term sustainability of such a strategy—especially if Japan faced international sanctions—would depend on political will.

Potential for nuclear weapon proliferation: High/Medium

II. Domestic and International Political, Legal, and Strategic Conditions for South Korean and Japanese Nuclear Weapon Development

South Korean and Japanese development of nuclear weapons would entail domestic political difficulties (national consensus would be important, considering both states are democracies), domestic and international legal complications, and international economic, diplomatic, and military risks. This section assesses these issues.

Political, Legal, and Strategic Issues

(xi) Domestic political will

South Korea and Japan may have the technological capacity and capability to develop nuclear weapons, but they have not (publicly) made the fundamental government decision to do so. This subsection examines the status of the domestic political debate regarding indigenous nuclear armament. For both cases, there are substantial obstacles to forging the political will to develop nuclear weapons.

(xia) South Korea has experienced an open public debate over nuclear armament. Most notably, over the last decade public opinion has markedly shifted to support for indigenous nuclear weapons (~70%-75%) (Asan 2025; Asan 2025a). Moreover, numerous senior officials—including a sitting former president—have publicly discussed the idea (Choe 2023; Richey 2023).

Although denying any intention to develop nuclear weapons, the current South Korean government has negotiated with the US to receive the right to enrich uranium and reprocess spent civil nuclear fuel as part of a deal to construct nuclear-powered submarines (Davenport 2025; Cho 2026). This would allow South Korea to close the nuclear fuel cycle and thus advance significantly on the spectrum of nuclear weapon latency.

Potential for nuclear weapon proliferation: Medium

(xiβ) Japan's nuclear weapon debate is informed—and muddled—by the fact that it is already a threshold nuclear weapon power. Namely, Japanese public discussion of nuclear weapons shows a lack of urgency (US National Intelligence Estimate 1967; Sneider 2026). Public opinion remains opposed (~60%) to nuclear weapon possession, despite widespread doubt (77%) that the US would protect Japan in the event of a military threat (Japan Times 2026). Nearly one-third of Japanese believe the country should review its “Three Nonnuclear Principles” (no possessing, producing, or introducing nuclear weapons in Japan) (Kelly and Geddie 2025). The political debate on the nuclear weapon issue has begun to move into high-ranking circles, with a small

number of political figures—including LDP heavyweight Taro Kono and defense minister Shinjiro Koizumi—broaching the possible need for Japanese nuclear weapons (*Kelly and Geddie 2025; Kelly and Geddie 2025a; Kelly et al 2025; Japan Times 2026a*).

Potential for nuclear weapon proliferation: Low/Medium

(xii) Domestic and international legal framework

Closely connected to the issue of domestic political will is the nature and extent of domestic and international legal frameworks that constrain or enable decisions to develop nuclear weapons. For South Korea and Japan, legal constraints outweigh permissive conditions. With sufficient national consensus, these constraints (regardless of severity) could theoretically be overcome, but the higher the legal threshold, the higher the level of political consensus necessary.

(xiid) South Korea faces a dense web of legal constraints on nuclear weapon development stemming from its fundamental political commitment to nonproliferation. Domestically, legal frameworks restrict nuclear use to peaceful purposes. With North Korea, in 1992 South Korea signed the Joint Declaration on the Denuclearization of the Korean Peninsula, although the value of this is questionable, considering North Korean nuclear armament (*ROKMOFA 1992*).

Internationally, as a signatory to the Nuclear Nonproliferation Treaty (NPT), South Korea abandoned a minimal covert nuclear weapons program under US pressure in the 1970s (*WNA 2026c*). The NPT binds South Korea to forswearing nuclear weapon development and accepting international safeguards. Withdrawal is technically permitted under Article X but would likely trigger an international crisis (or require a major international geostrategic crisis). South Korea's bilateral 123 Agreement with the US further prohibits uranium enrichment or spent fuel reprocessing without US consent. This is currently under reconsideration (*Ibid.*). If, however, South Korea were to move toward nuclear weapon development without US consent, current US law would compel Washington to impose significant economic sanctions. The US would also possibly abrogate the US-South Korea military alliance.

Potential for nuclear weapon proliferation: Low/Medium

(xiib) Domestically, Article 9 of Japan's constitution formally renounces war and the threat or use of offensive force, which has been interpreted to prohibit nuclear weapons (*House of Representatives 1946*). However, Japan's Cabinet Legislation Bureau determined as early as 1965 that possessing nuclear weapons would not necessarily violate Article 9, leaving a narrow constitutional ambiguity (*Sukin 2021*). Even if policy rather than statute, Japan's self-imposed "Three Nonnuclear Principles" carry strong jurisprudential weight

(although there is an ongoing debate about revising them) (WNA 2026; WNA 2026d; *Japan Times* 2026a). Japan's Atomic Energy Basic Act also restricts research, use, and development of nuclear energy to peaceful purposes (*JLT* 1955). Internationally, Japan's 123 Agreement with the US allows it to enrich uranium and reprocess spent nuclear fuel, but as an NPT signatory (and participant in IAEA safeguards), Japan is bound not to manufacture or possess nuclear weapons (WNA 2026; WNA 2026d). Finally, as with South Korea, Japanese development of nuclear weapons without US permission would likely trigger economic sanctions and possible dissolution of the US-Japan alliance.

Potential for nuclear weapon proliferation: Low/Medium

(xiii) International economic, diplomatic, and military risks

The international community—both international organizations (e.g., UN Security Council) and states bilaterally (including adversaries and allies/partners)—is unlikely to allow (much less support) South Korean or Japanese plans to develop nuclear weapons without pushback. On the one hand, allies and trade partners—especially the US, China, Europe—have diplomatic and economic tools to leverage against proliferation. These include (especially) economic sanctions, to which South Korea and Japan are highly vulnerable. The US is also a critical defense/security ally of South Korea and Japan, roles it

could leverage to make nuclear weapon development prohibitively costly. On the other hand, geopolitical adversaries such as China and North Korea could choose to engage in military strikes—emboldened by US precedent in Iran—to prevent Seoul or Tokyo from developing nuclear weapons during their “valley of vulnerability.”

(xiiiia) South Korean nuclear weapon development would invite severe external pressure from multiple fronts. Washington might withdraw from or dramatically reduce its role as a security/defense ally, fundamentally undermining Seoul's deterrence posture. Both China and North Korea could see South Korean proliferation as a direct threat and choose preventive warfare. Japan would face domestic pressure to nuclearize, destabilizing the region. Economically, the US, China, Europe, Japan, and other economic partners could impose sweeping sanctions and technology export restrictions, damaging South Korea's export-driven economy. South Korean nuclear power station exports could also be undermined, if the US chose to restrict the licensed technology that South Korea uses in its export packages. One area of weakness would be precisely the domestic nuclear power industry, which relies on internationally sourced uranium for reactor fuel (under NPT/IAEA Nuclear Suppliers Group auspices)—if supply were disrupted, South Korea could face energy shortages. Internationally, South Korea might face UN Security Council sanction and broad diplomatic isolation, severely damaging Seoul's reputation as a responsible global actor.

There is a small chance that the US might—under certain circumstances—support South Korean nuclear weapon development, something that president Trump and some US officials have hypothetically broached (*Richey 2024*). That would fundamentally improve the risk calculus for Seoul.

Potential for nuclear weapon proliferation: Low/Medium

(xiiiβ) Japanese nuclear weapon development would feature many similar risks as those faced by South Korea. The US might withdraw from or dramatically reduce its role as a security/defense ally, fundamentally undermining Tokyo's deterrence posture. North Korea would not likely attack preventively, but China would see Japanese proliferation as a direct threat and could choose preventive warfare. South Korea would face domestic pressure to nuclearize, destabilizing the region. Economically, the US, China, Europe, South

Korea, and other economic partners could impose sweeping sanctions and technology export restrictions, damaging Japan's export-driven economy. Although to a lesser degree, Japan also uses internationally sourced uranium for civil reactor fuel (under NPT/IAEA Nuclear Suppliers Group auspices)—if supply were disrupted, Japan could incur more complicated nuclear fuel fabrication. Internationally, Japan might face UN Security Council sanction and broad diplomatic isolation, severely damaging Japan's reputation as a responsible global actor.

Like for South Korea, there is a small chance that the US might—under certain circumstances—support Japanese nuclear weapon development, which president Trump has hypothetically broached (*Ibid.*). That would fundamentally improve the risk calculus for Tokyo.

Potential for nuclear weapon proliferation: Low/Medium

III. Nuclear Weapon Development Capacity, Capability, and Political/Legal/Strategic Limits: Comparative Aggregate Assessment of South Korea and Japan

South Korea and Japan have the technological and industrial potential to develop nuclear weapons, but not to the same degree. They both also face serious political/legal and strategic constraints that disincentivize nuclear proliferation. As

derived according to the categories evaluated above, comparison of the aggregated assessment of the capacity, capability, and political/legal and strategic limits for South Korea and Japan to develop nuclear weapons shows the following results:

Table 1: Comparative Assessment of South Korean and Japanese Nuclear Weapon Development Potential by Indicator

Civil nuclear industry

Indicator	South Korea	Japan
Nuclear reactors/industry	M	H
Pu stockpile/access	M/L	H
U stockpile/access	L	H
Tr stockpile/access	H/M	H/M
Supply chain	H/M	H/M
Technical/expertise	H	H

Weaponization

Indicator	South Korea	Japan
Delivery systems	H	M
Military engineering	H/M	H
Strategic depth	M	H/M
Budget	H/M	H/M

Political/legal/strategic

Indicator	South Korea	Japan
Domestic political will	M	L/M
Legal	L/M	L/M
International risks	L/M	L/M

Legend: H = High, M = Medium, L = Low, "/" = split rating (range)

Across the thirteen dimensions, Japan stands out as having the broader and stronger overall profile, with particular strengths in civil nuclear capacity/capability (especially existing facilities for uranium enrichment and spent nuclear fuel reprocessing) and stockpiles of enriched uranium and separated plutonium. Japan's delivery systems clearly lag, and challenges in this area should not be underestimated.

South Korea has an advantage on political will and a clearly better profile on delivery systems. Both states face major obstacles to nuclear proliferation due to domestic/international law and external risk.

Overall analysis of current capabilities, capacities, and limits yields the following categorization for South Korea and Japan:

Table 2: Overall Trajectory of South Korean and Japanese Nuclear Proliferation

State	Nuclear spectrum location	Description
South Korea	Advanced latent nuclear power -> Threshold nuclear power?	Possesses advanced civilian nuclear infrastructure and enrichment/reprocessing potential. Constrained by policy/politics, law, and alliance commitments, but domestic debate over proliferation intensifying. Potential trajectory toward threshold status.
Japan	Threshold nuclear power	Technically could produce a nuclear device over a short time period. Constrained by policy/politics, law, and alliance commitments, not capability.

This study confirms that Japan is a threshold nuclear power from a technical perspective. An advanced latent nuclear power (Jo 2026), South Korea is trending toward threshold status—the key technical issue is whether ongoing negotiations with the US on South Korean uranium enrichment and

spent fuel reprocessing conclude in a way that makes the development of these capabilities available to South Korea.

There is much uncertainty about potential breakout time for both states, but commonly cited estimates are 6-36 months for

Japan and 2-5 years for South Korea. However, the issue of time misses the point, in many respects: a more fundamental issue would be under what conditions either state would decide to execute a nuclear weapon construction program. In the post-Cold War period, neither state has made the political decision to develop nuclear weapons because of a mix of lack of need (notably due to US security guarantees), lack of national consensus, and the major risks (both kinetic and economic) that proliferation would entail. Significant change in some or all of those factors would likely be necessary for South Korean and/or Japanese proliferation to occur.

Thus, if South Korea or Japan did decide to develop nuclear weapons, the model of proliferation—influenced by changes in the above factors—would be critical. One option, a covert nuclear weapon program, would be highly risky, likely detected, and difficult to execute within democratic constraints (given the lack of South Korean and/or Japanese domestic consensus for proliferation). In addition to the threat of devastating international economic sanctions and potential loss of US alliance support, this pathway would be highly destabilizing, notably during a final push to cross from threshold strategic nuclear latency¹³ to actual completion of a warhead.

Another model of South Korean or Japanese proliferation, a sprint to nuclear breakout, would perhaps be occasioned by a catastrophic breakdown in regional/global security. Crisis-driven risks in such an environment would be harrowing, and nuclear proliferation would likely make the

situation more volatile, but South Korea and Japan might consider proliferation a necessary step. It is difficult to imagine that Seoul and Tokyo would prefer this scenario to almost all attempts to manage regional/global security dynamics such that crisis could be obviated.

Lastly, yet a third (perhaps most straightforward) path would be for South Korea or Japan to proliferate with the (open or tacit) agreement of the US, as this would ease national consensus and significantly lower kinetic and economic risks. It is unlikely that the US would support such a move, but it is not unthinkable that US leadership could (under certain conditions, including belief that US extended nuclear deterrence was no longer sufficiently credible to adversaries such as North Korea) consider “friendly” proliferation beneficial to US interests. But although risks are reduced under this scenario, they are still present. Even completely setting aside kinetic and economic risk, the “friendly” proliferation model has a “be careful what you wish for” dynamic. South Korea and Japan would be starting down a nuclear armament pathway—full of complexity and uncertainty—with China and North Korea already at a significant nuclear weapons advantage. Their warhead numbers—trending toward the hundreds, or even 1,000+ in the case of China—and diverse delivery systems mean that South Korea and Japan would need more than a minimal deterrent to achieve meaningful strategic effects, thus over time obligating Seoul and Tokyo to commit to a full-scale nuclear weapon program. The implied potential nuclear arms race¹⁴ could produce a destabilizing security dilemma situation.

IV. Policy Recommendations

The proliferation trajectories assessed in this report—Japan as a threshold nuclear power, South Korea trending toward that status—present Europe in general (and Germany in particular) with concrete, if underappreciated, strategic interests. East Asian nuclear proliferation would destabilize the global nonproliferation regime, embolden revisionist actors more broadly, and undermine the credibility of what is left of the rules-based international order on which European security depends. The following policy recommendations—which substantially respond to the proliferation model conditions above—thus present themselves:

Reinforce the NPT regime through multilateral and bilateral diplomacy

Europe should use its collective diplomatic weight within the NPT review process, the IAEA, and the UN Security Council to resist any normalization of nuclear latency as a strategic posture. The paper identifies Japan's existing enrichment and reprocessing capabilities—permitted under its 123 Agreement with the US—as the clearest near-term proliferation source. European states, particularly France and the UK (both nuclear powers and NPT depositary states), could press for reinforced IAEA safeguards on closed nuclear fuel cycles in non-weapon states. This could also apply to South Korea, if it were to achieve uranium enrichment and spent nuclear

fuel reprocessing rights and (eventually) capabilities. Also in the case of South Korea, if it were to close the nuclear fuel cycle, Europe should encourage Seoul to establish not only stringent international safeguards but also “sticky” domestic legal frameworks (such as constitutional amendment, rather than government policy) that would make more difficult diversion away from peaceful use of these capabilities (*Jun 2026*).

Champion nonproliferation as strategic policy

Germany in particular and Europe (outside France and the UK) in general occupy a distinctive position: they are non-nuclear NATO allies with a history of principled commitment to arms control. As they navigate their own defense posture transformations, Brussels, Berlin, and the other European capitals could leverage this credibility by taking a leading role in diplomatic outreach to Seoul and Tokyo—framing nonproliferation not as external pressure but as shared interest. Any expansion of Europe's bilateral or multilateral security partnerships with East Asian democracies could include augmented, explicit nonproliferation conditionality and confidence-building measures. For both South Korea and Japan, the EU could include upgraded nonproliferation safeguards as a part of the development process of their respective Security and Defense

Partnerships. In the case of South Korea, this could—if needed—become integrated into the language of the EU-South Korea Security of Information Agreement (under negotiation).

Strengthen economic and technology governance

The report underscores that Seoul and Tokyo—as export-dependent economies—are highly sensitive to economic/trade incentives. Europe could develop, in coordination with the US and other partners, frameworks for economic measures that could disincentivize credible imminent proliferation moves—the reverse side of this approach could make clear that deepened economic integration is available as a positive inducement for nonproliferation compliance. Germany, as Europe’s largest economy and a major trading partner of South Korea and Japan in particular, is especially well-placed to make this linkage concrete and credible. Export controls on dual-use technologies relevant to nuclear weaponization—precision machine tools, high-performance computing components, specialty materials—should be harmonized and monitored across the EU.

Support US integrated deterrence credibility

This report identifies that a major driver of proliferation pressure in East Asia is declining confidence in US security guarantees. While Europe cannot substitute for the US in this role, it can reinforce deterrence credibility indirectly by strengthening transatlantic cohesion. A Europe—and a Germany—that demonstrates credible self-defense investment and strategic seriousness reduces the broader narrative of Western alliance unreliability that feeds proliferation incentives. More pertinently, a self-defense credible Europe takes pressure off the US in terms of obligations to the Euro-Atlantic theater, thus allowing it (in principle) to focus on the Indo-Asia-Pacific, bolstering reassurance in South Korea and Japan. This report also identifies severe global/regional geopolitical/geostrategic crisis as a possible permissive condition for South Korean and/or Japanese nuclear armament. Europe—Brussels, Berlin, and the other European capitals—should augment their capabilities to prevent and defuse potential major severe crisis, both for their own immediate benefit and as a part of preventing normatively undesirable nuclear proliferation.

Endnotes

- 1 Depending on warhead design.
- 2 On a scale of Low/Medium/High.
- 3 3-5% LEU within a larger volume of U-238 acting as a neutron absorber and in situ fuel source.
- 4 This is not standard practice. Standard practice is to use reactors dedicated to producing Pu-239 for military use.
- 5 The enrichment process would also allow production of depleted uranium used as a warhead tamper.
- 6 It is also unique among signatories to a US 123 Agreement in having a closed nuclear fuel cycle.
- 7 Only 1 cascade is currently operating. The Rokkasho enrichment plant is undergoing improvements to increase its output to 450,000SWU/yr by 2029 (*WNA 2026d*).
- 8 $17,500 \text{ tons of spent fuel} \times .01 \text{ (percentage by mass of plutonium in spent fuel)} = 175 \text{ tons of plutonium} = 175,000\text{kg of plutonium}$. $175,000\text{kg (total kg of plutonium)} / 12\text{kg (assumed weight of plutonium per warhead)} = \sim 14,500 \text{ warheads}$.
- 9 Produced from natural uranium ($\sim 0.7\%$ U-235) converted into UF₆ fed into centrifuge cascades that increase U-235 isotope percentage to 3-5% (LEU for reactor fuel) or more ($\sim 20\%$ nominal threshold for HEU, and $\sim 90\%$ for weapons-grade HEU).
- 10 In thermonuclear weapons, tritium is produced in situ as a fusion fuel product of lithium deuteride.
- 11 The Hyunmoo-5 likely has IRBM range with a sufficiently light warhead (*Newdick 2026*).
- 12 Proliferators could opt for computer simulated testing instead of a physical detonation, but no nuclear-armed power has done so.
- 13 There is significant evidence (*Brewer 2026*) that strategic nuclear latency provides, at best, very limited coercive value to nuclear hedgers, while provoking destabilizing security dynamics.
- 14 To manage this, one could imagine a possible multilateral regional nuclear arms control regime—involving China, Russia, North Korea, Japan, South Korea, and the US—but this is extraordinarily difficult to envision.

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