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Foreign Cases of Nuclear-Powered Submarine Acquisition:

Key Issues and Implications

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Foreign Cases of Nuclear-Powered Submarine Acquisition: Key Issues and Implications

I Introduction

- As North Korea's nuclear capabilities grow more sophisticated, the need for a broader range of military response options has been increasingly emphasized, with nuclear-powered submarines emerging as a compelling alternative.
  - Alongside options such as the redeployment of U.S. tactical nuclear weapons, indigenous nuclear armament, and the development of latent nuclear capabilities, nuclear-powered submarines are highlighted as a means of alleviating security anxieties arising from North Korea's nuclear strike threats.

- Nuclear-powered submarines are widely regarded as asymmetric deterrent assets: mobile undersea bases capable of prolonged submerged operations, including surveillance and reconnaissance, that can survive a nuclear first strike and still execute retaliatory missions.
  - Operationally, they are also viewed as the most effective platform for countering the submarine-launched ballistic missile (SLBM) force North Korea is expected to field.[1]

- South Korea is generally considered capable of constructing nuclear-powered submarines, but stable access to nuclear fuel would hinge on cooperation from the United States and other key actors in the global non-proliferation regime.

- This report analyzes nuclear-powered submarine acquisition by latecomer states beyond the P5 and examines the key issues that would arise if South Korea pursued a similar program, with a view to deriving policy implications.
  - Under the second Trump administration, tougher negotiations are expected on alliance issues such as defense cost-sharing and the future of U.S. Forces Korea, creating an opportunity to reconsider bargaining strategies within the alliance framework.

1 Lee Yun-cheol and Ryu Hae-seong, "Response Measures of the ROK Navy to North Korea's Asymmetric SLBM Threat," *National Defense Studies*, Vol. 61, No. 2, June 2018.

Ⅱ Nuclear-Powered Submarine Acquisition by Latecomer States

1. India

- India launched a nuclear-powered submarine program in 1974, before developing nuclear weapons, and completed construction of its first nuclear-powered submarine, the INS Arihant, in 2009; the boat entered operational service in 2016.[2]
  - The hull was built using Russian and French technology, and the submarine is powered by a Russian pressurized light-water reactor.
  - Arihant is a strategic nuclear submarine (SSBN) capable of carrying nuclear weapons, and India plans to expand the class to at least four vessels.

- Prior to building its own nuclear-powered submarines, India leased Soviet and later Russian boats to acquire relevant technologies and operational experience.
  - It operated a Soviet Charlie-class SSN from 1988 and a Russian Akula-class SSN from 2012 under lease arrangements.
  - These leased platforms were nuclear-powered attack submarines armed with conventional, not nuclear, weapons.

- India's approach combines interim leasing with incremental indigenous construction in a mutually reinforcing way.
  - Leasing SSNs allowed India to meet immediate operational requirements while accumulating technical know-how and operational experience.
  - Time-consuming indigenous construction has been reserved for SSBNs carrying nuclear weapons, thereby reducing proliferation sensitivities.

2 For nuclear-powered submarine acquisition cases of India, Brazil, and Australia, see: Kang Jong-won and Park Chan-hyun, "Analysis of Economic Ripple Effects by Korean Nuclear Submarine Acquisition Methods," *Journal of the Korean Institute of Defense Technology*, 5(4), 2023.

- As a leading non-aligned state and a de facto nuclear-armed country outside the Nuclear Non-Proliferation Treaty (NPT), India has faced few constraints from the NPT regime or from its relationship with the United States in its nuclear-powered submarine decisions.
  - It has relied on Russian leasing for operational know-how and on Russian and French assistance for hull and reactor design.

2. Brazil

- Brazil's nuclear-powered submarine program began in the late 1970s and gained momentum following a 2008 technology-cooperation agreement with France and the launch of the PROSUB (Programa de Desenvolvimento de Submarinos) project.
  - Brazil had already secured nuclear fuel supply capacity, having successfully enriched uranium at the Institute for Energy and Nuclear Research (IPEN) in 1982 using centrifuge technology.
  - While some reactor technologies were transferred from France, Brazil reached independent manufacturing capability when the state-owned firm Nuclebras developed a prototype reactor in 2018.
  - Hull design and construction have advanced significantly under PROSUB, largely through French technical cooperation.

- Brazil first produced diesel-electric submarines via technology transfer from the French company DCNS (now Naval Group); its first nuclear-powered submarine is currently under construction.
  - The diesel-electric submarines consist of four Scorpène-class vessels built under this cooperation, and the nuclear-powered submarine, Alvaro Alberto, is being designed based on the French Barracuda-class model.
  - Completion of Alvaro Alberto was initially planned for the mid-2020s but has been postponed to the early 2030s due to technical and fiscal constraints.

- Brazil is a rare non-nuclear-weapon state that has pursued parallel development of diesel-electric and nuclear-powered submarines over an extended period.
  - Among the three core components of a nuclear-powered submarine—nuclear fuel, reactor, and hull—Brazil has achieved technological independence in fuel and reactor development.
  - In hull design, major breakthroughs have been achieved via cooperation with France, beginning with diesel-electric submarines and moving toward a nuclear-powered platform.

- Brazil has pursued its nuclear-powered submarine within the NPT framework and, lacking militarily hostile neighbors, has not been driven by acute regional security pressures.
  - With relatively broad diplomatic flexibility, it selected France—known for a more permissive stance on transferring sensitive military technologies—as its primary partner.

3. Australia

- In response to a changing Indo-Pacific security environment, including China's rise, Australia sought to replace its Collins-class submarines and initially pursued new conventional submarines from the UK and France.
  - A 2013 defense and security cooperation treaty with the UK opened discussions on submarine cooperation, including a nuclear-powered option.[3]
  - In 2016, weighing technology transfer and domestic economic benefits, Australia signed a contract with the French company DCNS (now Naval Group) to procure twelve Attack-class submarines.
  - Even after selecting the French design, debate over costs and effectiveness sustained arguments in favor of nuclear-powered submarines.[4]

3 Wayne Reynolds, "An Astute Choice: Anglo-Australian Cooperation on Nuclear Submarines in Historical Perspective," *Security Challenges*, 9(4), 2013.

4 Peter Briggs, "Establishing An Australian Nuclear-Powered Submarine Capability," Australian Strategic Policy Institute, 2018; Ahn Sang-wook, "AUKUS Launch and France's Response," *EU Studies*, No. 61, 2022.

- Australia ultimately created the the AUKUS partnership with the United States and the United Kingdom and, under this framework, agreed to acquire eight nuclear-powered submarines by 2040.[5]
  - Although no final decision has yet been announced, reports indicate that the program envisages direct procurement of UK-built boats using U.S.-supplied reactors fueled with highly enriched uranium.
  - To mitigate a looming capability gap as the Collins class retires, Australia is also considering leasing U.S. nuclear-powered submarines.

- Australia's decision did not emerge from a gradual, long-term nuclear-submarine program; instead, an existing conventional replacement effort was abruptly reoriented toward nuclear-powered submarines.
  - Lacking both a civilian nuclear industry and indigenous submarine-building capacity, Australia depends on foreign partners for fuel, reactors, and hulls, leaving direct procurement as the only viable option.
  - This constitutes an exceptional case in which the United States, while formally upholding non-proliferation policy, has agreed to provide nuclear-powered submarines to a non-nuclear-weapon state other than the United Kingdom.

- Overall, Australia's decision to acquire nuclear-powered submarines has been driven primarily by alliance considerations despite its lack of a domestic nuclear industrial foundation and limited submarine construction capabilities.

5 Julia Masterson, "U.S., UK Pledge Nuclear Submarines for Australia," *Arms Control Today*, October 2021.

〈Table 1〉 Comparison of Nuclear-Powered Submarine Acquisition by Latecomer States

	India	Brazil	Australia
Country Type	· de facto nuclear-weapon state · non-aligned	· non-nuclear-weapon state · absence of alliances	· non-nuclear-weapon state · AUKUS alliance
Acquisition Objective	· countering China / Pakistan · regional hegemony	· South American regional leadership	· countering the China threat
Acquisition Method	· lease + technology transfer	· technology transfer	· direct overseas procurement
Technological Capacity	· nuclear fuel available · lacking hull / reactor	· nuclear fuel / reactor available · lacking hull	· lacking hull, reactor, and nuclear fuel
Partner Countries	· Russia, France	· France	· U.S., UK
Submarine Type	· strategic ballistic missile submarine (SSBN)	· attack nuclear-powered submarine (SSN)	· attack nuclear-powered submarine (SSN)

Ⅲ Key Issues in South Korea's Pursuit of Nuclear-Powered Submarines

1. Progress and Current Status

- South Korea's first attempt to acquire nuclear-powered submarines was Project 362 under the Roh Moo-hyun administration in 2003.
  - In 2003, the Navy reported Project 362—centered on the acquisition of nuclear-powered submarines, for which conceptual design approval had been granted on June 2, 2003—to President Roh and obtained his authorization.
  - The plan envisaged deploying three Korean SSNs (approximately 4,000-ton class) by 2020, using a hull modeled on the French Barracuda class, with reactors and fuel sourced from Russia.
  - The highly classified project was leaked to the media in January 2004; combined with subsequent scrutiny of South Korea's uranium enrichment activities later that year, the program was ultimately suspended.

- In 2017, the Moon Jae-in administration revived the nuclear-powered submarine initiative—originally a presidential campaign pledge—by opening negotiations with the Trump administration.[6]
  - During ROK-U.S. presidential phone calls in August and September 2017, South Korea's interest in nuclear-powered submarines was raised, and there were indications that President Trump expressed interest.
  - On August 10, 2020, the ROK Ministry of National Defense announced in its 2021-2025 Mid-term Defense Plan that it would build 3,600-ton and 4,000-ton submarines.
    ※ The 4,000-ton class Jangbogo-III Batch-III submarine was likely designed with the intention of potential future conversion to nuclear propulsion.
  - In September 2020, Deputy National Security Adviser Kim Hyun-chong visited Washington to seek U.S. cooperation, including naval nuclear fuel supply; but media reports indicate that the U.S. response was negative.

6 Ban Gil-ju, "Middle Power Geopolitics and South Korea's Naval Force Planning: Analysis of Intrinsic Drivers of Light Aircraft Carrier and Nuclear-Powered Submarine Acquisition Policy," *Peace Studies* Fall, 2021.

- Following the launch of AUKUS in September 2021, expectations in South Korea for the acquisition of nuclear-powered submarines temporarily increased; however, momentum faded after the Biden administration signaled that Australia would remain the sole exception for U.S. nuclear-submarine technology sharing.[7]
  - In its final year, the Moon administration effectively prioritized a light aircraft carrier over nuclear-powered submarines, allocating 7.2 billion won in the 2022 defense budget for the carrier program.

- Since 2022, policy priority has shifted toward strengthening U.S.-ROK extended deterrence and South Korea's "three-axis" system, further weakening momentum for nuclear-powered submarines.
  - The 2024-2028 Mid-Term Defense Plan, released on December 12, 2023, makes no reference to the 4,000-ton Jangbogo-III Batch-III, suggesting de facto discontinuation.
  - Nonetheless, the Navy and domestic defense industry appear to be continuing research on small reactors potentially applicable to nuclear-powered submarines.

2. Review of Key Issues

[Necessity and Cost-effectiveness of Nuclear-Powered Submarines][8]

- Many analysts argue that nuclear-powered submarines are indispensable for reinforcing deterrence against North Korea's increasingly sophisticated nuclear and missile threats.
  - These platforms could survive a first strike and retain the ability to conduct retaliatory strikes, thus bolstering deterrence.
  - To counter North Korea's submarine-launched ballistic missiles (SLBMs), which are nearing operational deployment, nuclear-powered submarines—offering virtually unlimited submerged endurance and two to three times the mobility of diesel-electric submarines—are viewed as essential.

7 Kim Dong-eun, "Analysis of the Relationship between Alliance Formation and Great Power Competition through 'Balance of Threat' Theory: Focusing on AUKUS's Nuclear-Powered Submarine Technology Transfer Decision," *National Strategy*, 29(3), 2023.

8 For positions for and against South Korea's nuclear-powered submarine acquisition, see: Cho Jae-wook, "International Political Approach to South Korea's Nuclear Submarine Acquisition and Exploration of Possibilities: Focusing on Limitations of South Korean Diplomatic Strategy within the U.S.-China Hegemonic Competition Structure," *International Political Studies*, 26(1), 2023.

- Nuclear-powered submarines also have value as an asymmetric strategic asset for countering potential threats from neighboring countries.
  - Given potential maritime contingencies with China and Japan, they are seen as a highly effective asymmetric means to offset South Korea's relative naval inferiority.

- Critics, however, question their operational value relative to diesel-electric submarines.
  - Nuclear-powered submarines are optimized for long-endurance operations in broad maritime areas, raising doubts about their necessity in the shallow, constrained waters around the Korean Peninsula.
  - Nuclear-powered submarines are generally considered noisier than diesel-electric submarines, which may make them less suitable for highly stealth-dependent missions.
  - Nonetheless, even with such operational limitations, their role as asymmetric deterrent assets remains significant in light of North Korea's growing nuclear threat.

- Additional criticism argues that introducing nuclear-powered submarines would conflict with principles of the peaceful use of nuclear energy and denuclearization of the Korean Peninsula and could generate friction within the ROK-U.S. alliance while heightening tensions with neighboring states.
  - A competing view holds that, because the nuclear material would be used in reactors than in explosive devices, its status as "military use" is debatable and that clear military necessity can justify a degree of diplomatic friction.

- Another key argument against acquiring nuclear-powered submarines concerns the enormous costs and long construction timelines involved.
  - A single nuclear-powered submarine is estimated to cost 1.5~2 trillion won; the minimum three-boat force required for deployment, maintenance, and standby would likely cost 5~6 trillion won.
    ※ France's Suffren-class (4,700 tons): 1.6 trillion won per vessel
  - Additional expenditures would be required for operation, maintenance, infrastructure, and training.

- Construction is expected to take at least seven years, which, given rapid military technological change, raises questions about the platform's relative utility at entry into service.
- While the substantial fiscal burden of nuclear-powered submarines is undeniable, decisions on which capabilities to prioritize under a limited defense budget ultimately fall within the realm of political and policy judgment.

[Major Barriers]

- Small reactors and nuclear fuel used in nuclear-powered submarines do not constitute nuclear explosive devices, and therefore do not violate the NPT or fall under routine inspection.
  - The operation of nuclear-powered submarines by non-nuclear states is interpreted as consistent with NPT and IAEA regulations according to INFCIRC/153, which specifies a safeguards exemption for nuclear material used in non-explosive military activities by non-nuclear-weapon states.[9]
  - However, it would still be necessary to conclude a separate arrangement with the IAEA specifying the duration and conditions governing the use of the nuclear material.

- The three elements of a nuclear-powered submarine are the hull, small reactor, and nuclear fuel, and the manufacturing technologies and supply capabilities for each of these components can pose significant barriers.
  - Although India and Brazil were able to secure their own nuclear fuel, limitations in hull design and small reactor production technologies emerged as the main obstacles.
  - Australia, by contrast, lacked all three elements—hull design, small reactor technology, and nuclear fuel supply—making direct acquisition from the United States and the United Kingdom unavoidable.

- In South Korea's case, it is assessed that the country can fully secure the design capability for 4,000-ton-class or larger submarines suitable for nuclear propulsion and the technology to build small reactors.[10]

9 Laura Rockwood, "The Australia-UK-U.S. Submarine Deal: Submarines and Safeguards," *Arms Control Today*, December 2021.

10 For technical challenges for nuclear-powered submarine construction and South Korea's technology level, see:

- Over more than three decades, Hanwha Ocean and HD Hyundai Heavy Industries have accumulated submarine-building expertise and now possess the design and construction capabilities for 4,000-ton-class or larger submarines capable of carrying SLBMs and adaptable for nuclear-powered configurations.
  ※ LIG Nex1 has also succeeded, after decades of effort, in indigenizing SONAR systems, the 'eyes and ears' of submarines.
- South Korea's small modular reactor technologies—such as KAERI's SMART reactor and Doosan Enerbility's i-SMR—are widely regarded as readily applicable to nuclear-powered submarine propulsion.

▪ South Korea could, with U.S. consent, either produce low-enriched uranium (below 20 percent) domestically for use as naval fuel or import it from abroad, but in either case U.S. cooperation is essential given Washington's leading role in the Nuclear Suppliers Group (NSG).

- In particular, if South Korea were to acquire U.S.-type nuclear-powered submarines, which use fuel enriched to above 80 percent, the United States would have to supply the fuel, or the ROK-U.S. nuclear cooperation agreement, which currently restricts enrichment, would need to be amended.

[Acquisition Method and Model]

▪ There are three main options for acquiring nuclear-powered submarines—indigenous development and construction, technology cooperation and licensed production, and direct foreign procurement—each with its own advantages and disadvantages, and selected according to national circumstances.

▪ Indigenous development and domestic construction is only feasible when capabilities for submarine hulls, small reactors, and a stable nuclear fuel supply are all in place, but it offers strong economic spillover effects through linkages with domestic industry and job creation.

- While countries like France have succeeded relatively quickly, China's experience illustrates that, without sufficient technological maturity, extensive trial and error and very long lead times are unavoidable.

Jang Jun-seop, "Methods for Introducing Korean Nuclear-Powered Submarines," *Strategy 21*, 20(2), 2017, etc.

- Technology cooperation and licensed production is an option when a country lacks independent capabilities to build submarine hulls and small reactors; although it produces weaker economic spillover effects, it has the advantage of shortening construction timelines for nuclear-powered submarines.
  - India and Brazil, both of which had developed nuclear industries but lacked submarine hull construction technology, adopted this approach, yet experienced longer-than-expected schedules due to difficulties in securing effective technology transfer.

- Direct foreign procurement is the fastest way to acquire and deploy nuclear-powered submarines without going through a lengthy process of trial and error.
  - However, as Australia's case illustrates, this approach creates near-total dependence on foreign partners for maintenance, overhaul, and replacement, and raises concerns that costs will escalate exponentially over time.
  - Given current constraints on U.S. capacity to supply nuclear submarines in a timely manner, and the political burden that direct procurement from France would place on the ROK-U.S. alliance, the feasibility of a direct import option is generally regarded as low.

- Unlike predecessor states, South Korea is assessed to possess indigenous capabilities for submarine hull construction and small reactor production, giving it a wider range of options; the key variable is the stable supply of nuclear fuel.
  - Whereas countries such as India and Brazil have faced their greatest hurdle in hull design, South Korea would be in a comparatively favorable position—and able to field capabilities more rapidly—if it can resolve the nuclear fuel supply issue.
  - Regardless of whether low-enriched or highly enriched uranium is used, U.S. approval and/or revision of the ROK-U.S. 123 Agreement would be required, making it necessary to address the fuel supply issue through licensed production arrangements.
  - It is also important to consider that technology cooperation and licensed production can shorten the timeline for introducing nuclear-powered submarines and facilitate the acquisition of operational know-how.

- If South Korea acquires nuclear-powered submarines, the primary purpose would be to counter North Korea's nuclear missile threat, making it essential to select a platform optimized for operations in the waters around the Korean Peninsula.
  - As the mission is not blue-water power projection, smaller and less costly boats of 5,000 tons or below—such as France's Barracuda class—are considered more appropriate than larger, 7,000-ton-plus designs like the U.S. Seawolf / Virginia classes or the UK's Astute class.

- Since South Korea is a non-nuclear-weapon state, the submarine type South Korea acquires would basically be classified as an attack nuclear submarine (SSN) rather than a strategic nuclear submarine (SSBN), although the possibility of SLBM armament remains.
  - While attack submarines are typically armed with cruise missiles and torpedoes, South Korea has already fitted SLBMs to conventional diesel-electric submarines, indicating that integration of SLBMs onto a nuclear-powered platform would be entirely feasible.

〈Table 2〉 Major Nuclear-Powered Submarine Classes

Country	Class (SSN/SSBN)	Displacement (tons)	Cost (won)	Capabilities
U.S.	Seawolf (Hull No. 1, 2)	9,285	3.39 trillion	· World's strongest attack submarine · 8 torpedo tubes
	Virginia	7,925	3.04 trillion	· State-of-the-art multi-mission attack submarine · 4 torpedo tubes · 12 vertical launch cells for cruise missiles · 2 vertical launch cells for ballistic missiles (later variant)
China	Shang	6,096	Unknown	· 1990s Western submarine-level performance
UK	Astute	7,519	1.78 trillion	· Highly sophisticated, cutting-edge submarine · 6 torpedo tubes
France	Barracuda	5,200	1.69 trillion	· Next-generation multi-purpose attack submarine · 4 torpedo tubes · 12 vertical launch cells for cruise missiles
India	Arihant (SSBN)	6,600	Unknown	· Smallest SSBN-class submarine · 4 torpedo tubes · 4 vertical launch tubes for ballistic missiles

Ⅳ Implications and Policy Considerations

- While there is debate over the necessity of nuclear-powered submarines, the severity of North Korea's nuclear threat suggests that, despite the associated fiscal and diplomatic costs, their introduction warrants active consideration.

- In particular, the second Trump administration's emphasis on strengthening allies' self-defense capabilities creates a timely window for South Korea to pursue nuclear-powered submarines.
  - Drawing on Washington's focus on shipbuilding cooperation, Seoul could explore a package in which Korean investment in U.S. shipyards is linked to technology transfer and licensed production of nuclear-powered submarines.
  - Deployment of Korean nuclear-powered submarines would also contribute to the China-containment role prioritized by the Trump administration.

- Negotiations on nuclear-powered submarines could also be used to seek revision of the ROK-U.S. nuclear cooperation agreement, which currently restricts uranium enrichment and reprocessing, thereby yielding the additional benefit of securing latent nuclear capabilities.
  - Under such a deal, South Korea would import submarine technology from the United States but push to amend the agreement so it can procure nuclear fuel itself rather than rely on direct U.S. supply.
  - Seoul could further argue that allowing Korean enrichment would help counter Russia and China's dominance of the global enrichment supply chain
    ※ Global enriched uranium supply chain structure: Rosatom (Russia) 44%, CNNC (China) 14%, Urenco (UK·Germay·Netherlands) 29%, Orano (France) 12%

- Among latecomer nuclear-powered submarine states, none besides France and China has opted for fully independent construction, largely because technological limits and schedule pressures have driven others toward foreign technology cooperation.

- Considering overseas cases and South Korea's existing submarine-building capabilities, independent development or co-production through technology cooperation appears preferable to direct import.
  - Although direct purchase enables the fastest deployment, it entrenches permanent dependence on foreign suppliers and yields little domestic economic benefit.
  - Since South Korea already possesses hull and small reactor technologies, it should ultimately aim for full indigenous development and production.
  - Given the need to secure a stable nuclear fuel supply, shorten construction timelines, and build operational and maintenance know-how for nuclear-powered submarines, South Korea should initially prioritize technology cooperation and co-production.

- Given the rapid advancement of North Korea's nuclear missile capabilities and the urgent need for deployment, South Korea should consider leasing nuclear-powered submarines during the interim period before a domestic production base is in place, prioritizing U.S.-built boats and using the lease to train crews and operators.

- It would also be advisable to declassify and publicly pursue the nuclear submarine program, rather than treating it as a covert project, in order to demonstrate Seoul's determination and strengthen its bargaining position with external partners.

- Unlike tactical nuclear weapons, intermediate-range missiles, or THAAD deployment, introducing nuclear-powered submarines is unlikely to trigger intense backlash from neighboring countries and can be justified on solid grounds.
  - Nuclear-powered submarines are purely a component of South Korea's own force and thus fall squarely within its sovereign rights.
  - With Kim Jong Un's on-site inspection of nuclear-submarine construction publicly reported (March 8, 2025), North Korea appears to be accelerating its development of strategic nuclear submarines, one of its five core defense tasks. In this context, the case for South Korea to acquire nuclear-powered submarines as a countervailing capability is becoming increasingly compelling.

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Abstract

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As North Korea's nuclear capabilities advance, calls for a broader range of military response options have intensified, with nuclear-powered submarines emerging as a particularly compelling alternative. Among latecomer states, virtually none has relied on fully indigenous development, mainly due to technological constraints and the need to shorten timelines, which has made international technological cooperation essential. Direct foreign procurement—as in Australia's case—offers the fastest path to operational capability but entails permanent dependence on external suppliers and limited domestic economic spillover. By contrast, while countries such as India and Brazil have faced their greatest challenges in hull design and construction, South Korea's principal constraint lies in securing a stable supply of nuclear fuel. South Korea is generally assessed to have the technological capacity to design and build 4,000-ton-class submarines suitable for nuclear propulsion and to manufacture small nuclear reactors, but reliable access would require sustained cooperation from the United States. Although debate persists over the necessity of nuclear-powered submarines, the growing severity of North Korea's nuclear and missile threat—including its pursuit of ballistic missile submarines (SSBNs)—makes it difficult to dismiss these assets despite their financial and diplomatic costs. Negotiations on introducing nuclear-powered submarines could also create an opportunity to revise the ROK-U.S. 123 Agreement, which currently restricts uranium enrichment and reprocessing, thereby strengthening South Korea's latent nuclear capabilities. Considering foreign cases and South Korea's existing shipbuilding and nuclear technology base, indigenous development or production via technology cooperation and licensed manufacturing appears preferable to direct importation. To signal commitment and enhance bargaining leverage with external partners, the program should be pursued transparently rather than as a covert project.

Keywords: nuclear-powered submarine, hull design, small reactor, nuclear fuel, licensed production

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