# TRILATERAL ENERGY SECURITY COMMITTEE

# INVESTMENT PRIORITIES:

## Strategic Framework for US-Korea-Japan Collaboration

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**Trilateral Energy Security Investment Priorities: Strategic Framework for US-Korea-Japan Collaboration**

## Introduction

The 2023 Camp David Summit established the foundation for a new era of energy and economic security collaboration between the United States, the Republic of Korea, and Japan. We build on this framework to identify priority investment areas where coordinated trilateral action will deliver strategic and commercial value, strengthen supply chain resilience, and hedge against escalating geopolitical risks. Eight investment priorities are categorized into Tier I priorities to address immediate, high-risk vulnerabilities, and Tier II for long-term resilience. These recommendations reflect the convergence of energy security, supply chain resilience, and defense considerations, making trilateral cooperation strategically vital.

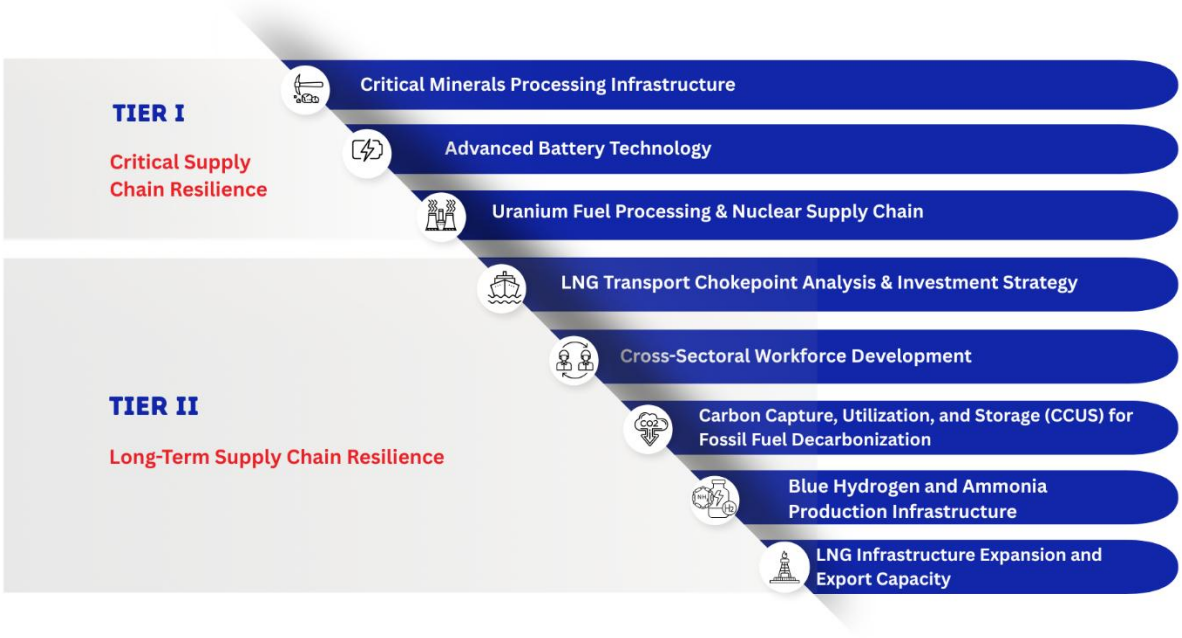


*Figure 1: Trilateral Energy Security Investment Priorities: Tiered Framework Overview*

## Tier I: Critical Supply Chain Resilience

### 1. Critical Minerals Processing Infrastructure

While President Trump's March 2025 executive order has accelerated U.S. critical minerals production, further investment coordination is needed. Critical minerals, including lithium, cobalt, nickel, graphite, rare earth elements (REEs), and molybdenum, are indispensable for defense platforms, advanced batteries, nuclear containment vessels, and grid modernization. High-purity and electrical steel also play a pivotal role in these sectors due to their use in containment, infrastructure, and grid components, though steel itself is not classified as a critical mineral.

Yet all three nations remain heavily reliant on Chinese supply chains. China currently controls 69% of global REE production and holds half of the world's deposits, about 22 times more than U.S. reserves (Huld, 2025). For cobalt, the Democratic Republic of Congo accounts for over 90% of extraction, while

China controls approximately 80% of processing. Rising demand from electric vehicles, energy storage, and nuclear development deepens these vulnerabilities, making immediate investment critically urgent.

***Strategic Focus: Processing Technology and Labor Development***

Rather than tackling the entire supply chain simultaneously, the trilateral partnership should prioritize processing facilities and workforce development as the most controllable entry points. Focused investments should leverage U.S. resource endowments and financing tools with Japan's advanced processing technologies and South Korea's battery manufacturing leadership. The U.S. Department of Energy has allocated $80 million for Mining Technology Proving Grounds to test next-generation mining technologies while training skilled workers (DOE, 2025). Recent investment commitments from Japan and Korea in the U.S. should be extended to jointly establish training institutes that apply Korean and Japanese manufacturing expertise to address skilled labor gaps and build a sustainable workforce pipeline.

***Mineral Prioritization Framework***

The triad should prioritize minerals based on: (1) degree of single-country dependence, and (2) feasibility of addressing supply chain gaps within U.S. territory or through stable allied partnerships. A preliminary qualitative assessment identifies lithium, cobalt, and REEs as primary targets, resources where U.S. domestic capacity exists but requires scaling. Graphite and manganese supply should be addressed through substitution research, recycling technologies, and strategic reserves. Given the scarcity of reliable data in this field, collaborative efforts to globally accumulate and share critical mineral information would benefit the triad.

***Geopolitical and Commercial Benefits***

A trilateral strategy projects openness, reliability, and balanced partnership, encouraging participation from Southeast Asia, Australia, and potentially Africa regions where geology dictates critical mineral deposit locations. Compared to unilateral U.S. action, three-country collaboration provides superior risk mitigation and negotiating leverage when engaging resource-rich nations. By scaling initiatives such as the U.S. International Development Finance Corporation's $1 billion collaboration with Orion Resource Partners (Hook & Sevastopulo, 2025), Japan Oil, Gas and Metals National Corporation’s (JOGMEC) $600 million investments across 100+ critical mineral projects (Quest, 2025), and programs like Mineral Security Partnership (MSP) (Cho & Nakano, 2025), the triad can diversify supply, expand recycling and processing capacity, and reduce strategic exposure to Beijing while unlocking long-term commercial returns.

***Critical Mineral Storage Reserves***

Strategic storage for critical minerals is increasingly vital as geopolitical tensions like China's tightening export controls on germanium, gallium, and graphite, rise. Australia's Strategic Reserve Initiative for critical minerals strengthens supply security for domestic industries and key allies. Likewise, coordinated mineral stockpiles and processing facilities at major ports such as, Houston, New Orleans, Savannah, and key West Coast sites, would ensure resilience against supply shocks (IEA, 2022). Investments in strategic mineral reserves underpin supply chain resilience and economic competitiveness, fostering long-term stability and stronger international partnerships.

**2. Advanced Battery Technology**

Advanced battery technology is crucial for both commercial and defense applications, serving as a linchpin that connects critical minerals strategy with national security requirements. The triad should prioritize joint research initiatives focused on next-generation battery chemistries with reduced reliance on critical minerals, which can be applied to electric vehicles (EVs) and enhance resilience in variable renewable energy (VRE) systems. This approach not only addresses the growing demand for large-scale energy storage solutions that allow for greater energy grid reliability against disruption and more diverse, robust energy supply profiles.

Small-scale battery technologies remain vital for defense applications, unmanned aerial systems (drones), robotics, and portable military power systems, transforming battery leadership into a core national security issue for all three countries. This dual focus elevates battery technology from a commercial concern to a national security imperative, strengthening the case for Department of Defense support and funding. South Korea's leadership in battery manufacturing provides a foundation for rapid commercialization, while Japanese material science and precision engineering expertise complements Korean manufacturing capacity. U.S. research institutions and defense laboratories drive breakthrough innovations. Shared intellectual property frameworks supporting trilateral commercialization pathways ensure innovations benefit all partners while accelerating deployment.

**3. Uranium Fuel Processing & Nuclear Supply Chain**

Nuclear energy demand is surging due to carbon efficiency policy goals and data center baseload requirements. Japan and South Korea rely entirely on enriched uranium imports and neither country has active uranium mining; Japan’s enrichment capacity is limited (World Nuclear Association, 2021), while South Korea, a leader in reactor construction, faces significant challenges, including its reliance on foreign uranium and spent fuel storage issues. These vulnerabilities not only impact South Korea's energy security but also raise concerns for U.S. interests in the region. Additionally, South Korea is restricted under the 123 Agreement, limiting its rights to process or reprocess uranium fuel.

Despite having uranium deposits and enrichment capabilities, the United States will soon face its own supply chain vulnerabilities, as only a small fraction of milled and enriched fuel is sourced domestically, with a substantial portion relying on imports from Russia (Baskaran & Schwartz, 2025). The Prohibiting Russian Uranium Imports Act, signed by former President Biden in May 2024, bans Russian-produced unirradiated low-enriched uranium (LEU), disrupting established supply relationships. The convergence of geopolitics, conflict, and climate policy creates potent catalysts for nuclear industry transformation (Kramer, 2023).

Rebuilding scalable, domestic U.S. enrichment and fuel fabrication capability is essential. The triad should prioritize investment in U.S.-based fuel fabrication capacity supporting projected small modular reactor (SMR) deployment and existing fleet requirements. This includes expanding enrichment facilities, establishing fuel assembly manufacturing capacity, and addressing nuclear industry workforce pipeline constraints across the entire supply chain. Trilateral cooperation offers risk sharing and capital efficiency advantages, with Japanese and Korean utilities having direct incentives to ensure supply security.

## Tier II: Long-Term Supply Chain Resilience

### 4. LNG Transport Chokepoint Analysis & Investment Strategy

The United States is the largest LNG exporter, while Japan and South Korea rank as the world's second- and third-largest LNG importers. Despite robust trilateral economic relationships, shipping lanes through which LNG transits remain vulnerable to geopolitical tensions.

***Critical Vulnerability: Taiwan Strait***

Among multiple LNG transport chokepoints: including the Strait of Hormuz, Red Sea, and South China Sea- the Taiwan Strait represents one of the most critical yet fragile corridor for LNG shipments to Northeast Asia (Funaiole & Hart, 2024). Chinese naval drills, such as the April 2025 'Strait Thunder-2025A' exercise, increasingly simulate blockade scenarios (Gan & Cheung, 2025). If conflict blocks the Strait and/or sea-lanes around Taiwan, LNG carriers will be forced to bypass it via longer routes, increasing transit time and delivery costs.

***Panama Canal: Infrastructure and Governance Challenges***

U.S. LNG exports to Asia transit primarily through the Panama Canal, which faces mounting operational and political challenges. Prolonged droughts have restricted draft levels and reduced daily vessel transits. In 2024, Panama Canal LNG traffic declined 65% due to these constraints (Parraga, 2024). Alternative routing around the Cape of Good Hope adds two to three weeks of transit time and increases shipping costs (Resnick, 2024).

Political risks compound operational challenges. Since Panama assumed full Canal control in 1999, toll-setting and governance remain under Panama Canal Authority jurisdiction, creating vulnerability to abrupt fee increases or regulatory changes (Dr. T. Notteboom et al., 2024). Additionally, China has invested heavily in Panama's ports and logistics facilities, while the United States views the Canal as critical to economic and security interests - underscoring its strategic importance to both powers.

***Strategic Investment Priorities***

To address these vulnerabilities, investments must focus on both physical and political resilience:

*Infrastructure Upgrades:* Lock expansions to accommodate larger LNG carriers, modern traffic management systems, and advanced water management solutions, including new reservoirs and desalination projects

*Bilateral Engagement:* Long-term agreements with Panama emphasizing investment and management strategies, transparency in toll-setting, and coordinated stakeholder engagement.

*Shipping Capacity Analysis:* Assessment of LNG carrier fleet constraints given four-year shipyard backlogs and projected U.S. export volume increases particularly post-2030, to ensure that shipping capacity aligns with demand, and leverage South Korea’s shipbuilding capabilities.

**5. Cross-Sectoral Workforce Development**

The shortage of skilled workers is an acute risk across mining, advanced manufacturing, nuclear operations, and energy infrastructure sectors. Trilateral cooperation offers unique advantages. Japan and South Korea possess proven manufacturing excellence and workforce training systems transferable to U.S. operations. Training programs should focus on technical processing operations, quality control systems, and precision manufacturing, ensuring the joint investments in processing facilities is protected through a pipeline of qualified operators. The triad should expand existing initiatives, such as the trilateral quantum workforce training program linking Tokyo University, Seoul National University, and the University of Chicago, to develop joint training centers across critical sectors. U.S.-based education centers, modeled on successful vocational training systems in Korea and Japan, represent long-term investment (8-10 years) in sustainable capacity building. Harmonizing credentialing standards and creating visa pathways enabling skilled worker circulation would transform individual national workforce gaps into shared trilateral advantages.

**6. Carbon Capture, Utilization, and Storage (CCUS) for Fossil Fuel Decarbonization**

Japan and South Korea are both committed to the path of carbon neutrality by 2050, while fossil fuel usage, including LNG from the United States, will remain critical well beyond 2050. CCUS and co-firing of low-emission fuels such as hydrogen and ammonia will assist in achieving carbon reduction goals while allowing for the practical use of fossil fuels. As of 2024, the United States leads the world in CCUS, accounting for 60% of global carbon capture capacity and half of planned projects (Sagatelova & Fitzpatrick, 2024). Under JOGMEC, Japan has launched Asia's CCUS Network framework with seven projects underway (JOGMEC, 2024). South Korea recently enacted its first comprehensive legislation, the 2024 CCUS Act (Lee & Choe, 2024). For trilateral cooperation to succeed, partners must establish common standards for monitoring, reporting, and verification (MRV) satisfying each nation's regulatory authorities before frameworks become too rigid. Investment should target both scalable MRV harmonization and technological breakthroughs enabling scale and cost reduction. Co-firing technologies integrating ammonia and hydrogen into existing fossil fuel generation represents practical near-term emission reduction strategies leveraging current infrastructure.

**7. Blue Hydrogen and Ammonia Production Infrastructure**

Despite differing energy transition paces, blue hydrogen and ammonia represent practical near-term solutions that utilize existing fossil fuel infrastructure while increasing carbon efficiency, especially in power generation, heavy industry and shipping. Japan and Korea already operate pilot co-firing projects and ammonia-ready vessels; the U.S. is becoming a leading producer and exporter in markets, with global blue ammonia projected to expand at a 51.6% compound annual growth rate from 2025 to 2032 (Kiran, 2025). Notably, Japan has implemented government subsidies to support hydrogen and ammonia production, while South Korea has introduced incentive policies that encourage investment in carbon efficient technologies. Early investment catalyzes shared innovation, builds first-mover advantage in global clean fuel markets, and ensures that critical infrastructure like ports, pipelines, and storage is co-developed with interoperability in mind.

**8. LNG Infrastructure Expansion and Export Capacity**

Russia's ongoing disruptions, Panama Canal drought restrictions, and bottlenecks in U.S. Gulf export terminals demonstrate current LNG infrastructure fragility and the need for strategic storage reserves. These vulnerabilities grow increasingly consequential as the triad's electricity and natural gas demand surges, driven by energy-intensive AI data centers, industrial decarbonization, and rapid Southeast Asian economic growth. Early investment in expanding storage infrastructure allows the triad to withstand sudden supply disruptions, volatile price swings, and geopolitical coercion. This is evidenced by Europe's rapid gas storage buildup post-Ukraine invasion that prevented winter blackouts. The Power of Siberia 2 Russia-China pipeline deal offers China stable, long-term access to discounted Russian gas via land routes, bypassing global LNG markets dominated by U.S.-aligned suppliers (Henley, 2025).

To stay ahead, the triad must urgently strengthen LNG supply chains and expand export capacity beyond the congested U.S. Gulf Coast, prioritizing West Coast infrastructure for faster, more resilient Asian market access. Recent Canadian announcements, including federal approval of the Ksi Lisims LNG terminal and startup of LNG Canada, highlight competitive options with lower shipping costs and reduced carbon intensity due to hydropower (Reuters, 2025). Alaska's LNG export project, with updated cost estimates around $38 billion, remains under consideration but delivers gas at a higher cost relative to Canadian alternatives. Strategically, the triad should evaluate all export pathways, Alaska, Canada, Mexico, and emerging U.S. sites, based on cost, feasibility, resilience, control, and alignment with long-term security goals. For Japan and South Korea, opportunities extend beyond co-financing U.S. terminals to downstream investment in Southeast Asia, especially Vietnam, Indonesia, and the Philippines which face affordability and credit constraints. Coordinated triad investments can help de-risk projects and accelerate deployment, while also securing favorable market access and long-term geopolitical alignment.

## Conclusion: Strategic Imperative for Coordinated Action

The investment priorities outlined reflect converging imperatives: supply chain resilience, energy security, defense readiness, and economic competitiveness. China's dominance across critical mineral processing, growing geopolitical tensions affecting energy corridors, and accelerating global competition for energy technologies create a strategic environment where trilateral cooperation is essential.

The priorities identified here, particularly Tier I investments in critical minerals processing and advanced battery technology, represent areas where delays compound vulnerabilities and where early action secures long-term advantages. By moving decisively on near-term priorities while positioning for long-term investments, the United States, Japan, and South Korea can build resilient supply chains, reduce dependence on adversarial actors, and establish themselves as preferred partners for allies navigating their own energy transitions. The window for action is limited. For the triad, timely investment is the foundation of sustained security, prosperity, and global leadership.

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