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SWU Opportunity: Why Uranium Enrichment Is the Next Critical Infrastructure Play for AI Power

As artificial intelligence drives unprecedented electricity demand, the most overlooked bottleneck isn't building more nuclear reactors—it's the specialized uranium enrichment required to fuel them. While the market chases crowded “AI-adjacent” trades, the true, durable bottleneck—and the asymmetric investment opportunity—lies in the obscure and geopolitically fraught link of the nuclear fuel cycle: uranium enrichment, measured in Separative Work Units (SWU). The SWU bottleneck is being simultaneously tightened by three powerful forces: (1) the technological shift towards advanced reactors requiring High-Assay Low-Enriched Uranium (HALEU), which exponentially increases SWU demand per unit of fuel; (2) a geopolitically mandated decoupling of Western supply chains from Russia / China; and (3) a wave of government-led investment to onshore this critical capacity in the West. This convergence of technological, geopolitical, and policy catalysts is creating a durable, long-term scarcity in SWU capacity. We believe that targeting the SWU investment opportunity offers attractive investment with durable, rationally-valued exposure to AI's power-hungry growth.

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Executive Summary

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AI's Power Mandate

AI is transforming electricity demand much as the automobile transformed oil markets—but at an accelerated pace and on a massive, grid-level scale. The International Energy Agency now projects global data center electricity use to more than double by 2030 to roughly 945 TWh—about the present consumption of Japan. In most power markets, that growth will not be met reliably with intermittent generation alone. That funnels attention back to nuclear as 24/7, low carbon baseload. But the bottleneck is not the concrete and rebar of new reactors; it's the specialized uranium enrichment needed to fuel them—measured in Separative Work Units (SWU). This is where pricing power and durable scarcity are forming.

Enrichment capacity is highly concentrated, capital-intensive, slow to build, and geopolitically exposed. Russia's Rosatom accounts for more than 40% of global capacity—about 27.1 MSWU out of a ~61.5 MSWU global total in 2022—while China controls another 10–15%. That leaves Western utilities structurally reliant on a limited set of alternative suppliers. In response, the U.S. banned imports of Russian enriched uranium effective August 11, 2024 (with only narrow waivers through January 1, 2028) and committed $2.7 billion to re-establish domestic conversion and enrichment. These measures lock in a regime of scarcity across the SWU market for the foreseeable future

The policy momentum is accelerating. The Trump administration has explicitly made nuclear expansion a pillar of its energy and industrial strategy—framing nuclear not just as clean baseload, but as critical infrastructure for AI, defense, and grid security. Early signals suggest a willingness to back public-private partnerships, fast-track licensing, and scale DOE support, all of which reinforce the investment case for enrichment capacity. In effect, U.S. policy is no longer defensive (replacing Russian supply) but offensive—expanding domestic nuclear capabilities as part of a broader energy-dominance agenda.

Another underappreciated torque on SWU demand is the shift to advanced reactors that need high assay low enriched uranium (HALEU, 5–20% U 235). Producing 1 kg of HALEU from natural uranium requires ~42 SWU—roughly five to six times the separative work associated with today's ~5% LEU fuel per kilogram. The U.S. Department of Energy estimates domestic HALEU demand could reach ~50 metric tons/year by 2035, with initial tranches being allocated now for demonstrations. If even a modest fraction of new AI driven load ends up paired with advanced reactors, SWU intensity rises nonlinearly.

Prices are already signalizing upcoming shortage. Enrichment spot prices are currently at ~$188/SWU (term ~$166), 20% increase year over year and up 3x from the pre-Ukraine era. With decoupling from Russia, HALEU's outsized SWU requirement, and public policy catalyzing onshoring, we see a durable, multi cycle investment runway in SWU levered assets—rare exposure to AI's power growth that is rationally valued and fundamentally capacity constrained.

Thesis: SWU Is the Real Bottleneck—And the Cleanest Way to Be "AI Adjacent" Without Owning Overhyped Stories

Markets have sprinted into everything around AI power—copper, transformers, gas peakers, and renewables. The better risk/reward, in our view, sits in the industrial oligopoly pricing a unit of mathematical work (SWU) that converts a commodity (UF_6) into an essential fuel input (LEU/HALEU). Compared with miners and generic power names, enrichment offers:

1. *Structural scarcity*: few suppliers, large capex, long lead times.
2. *Policy tailwinds*: explicit Western programs to fund non-Russian conversion/enrichment and HALEU supply chains.
3. *Pricing power*: spot/term curves reset higher; utility contracting is lengthening on security of supply fears.
4. *Option on HALEU*: if advanced reactors scale, SWU intensity rises ~5–6× per unit fuel.

Skeptical take: "Why not just build more reactors?" Because without enrichment capacity and HALEU logistics (deconversion and fuel fabrication), new steel in the ground is just stranded capex. Enrichment is the narrowest throat in the fuel cycle, and the one most exposed to the Russia/China decoupling imperative.

SWU 101—Why "Separation Work" Is Where Scarcity Shows Up

SWU is the standard measure of the effort needed to raise U 235 concentration from natural (~0.711%) to reactor grades. The SWU burden depends on the product assay (e.g., 4.95% vs 19.75%) and the tails assay you choose (tradeoff between uranium feed and separative work). Lower tails assay conserves uranium but consumes more SWU—and enrichers flex between "overfeeding" and "underfeeding" depending on relative prices. This mechanism amplifies SWU demand when uranium prices rise or when utilities push security of supply.

For intuition: to produce 10 kg of ~4.5% LEU at 0.3% tails requires about ~62 SWU (≈6.2 SWU/kg). To produce 1 kg of 19.75% HALEU from natural, budget ~42 SWU. That alone explains why the HALEU era is a step function higher SWU world.

Demand: AI Power Is the Exhaust; Nuclear Fuel Is the Intake

Latest data shows Western (US + Europe + Japan/Korea/Taiwan) SWU demand at ~32-35 MSWU/yr. This demand is expected to grow 2.5% - 4% in the coming decade.

1. *AI/data centers*: IEA's April 2025 report projects global data center load doubling by 2030 to ~945 TWh, with AI the dominant driver. U.S. power demand forecasts for 2025–2026 already reflect commercial sector growth led by data centers. If utilities and hyperscalers seek 24/7, low carbon offtake, nuclear is the only scalable baseload candidate in Western world grids.

2. *Reactor life extensions and restarts*: policy and pricing now support extending existing fleets—incremental LEU demand that arrives years before new builds. (Supplier commentary and order book growth corroborate this.)

3. *Advanced reactors*: DOE pegs HALEU needs at >40 MT by ~2030 and ~50 MT/year by 2035; initial allocations to five developers were announced in April 2025. Even modest commercial adoption tilts the fuel mix toward higher SWU per MWh

Supply: Concentrated, Slow, and Geopolitically Constrained

Where we are today: According to WNA, global enrichment capacity in 2022 was ~61.5 MSWU; Rosatom accounted for ~27.1 MSWU (~44%). Urenco and Orano together were ~25.4 MSWU (40%), and China's CNNC was ~8.9 MSWU (15%), targeting ~17 MSWU by 2030—largely inaccessible to Western utilities. In short: the accessible Western market is structurally tight even before HALEU.

Policy shock: The U.S. ban on Russian enriched uranium took effect August 11, 2024; waivers can be granted only through January 1, 2028, to avoid security of supply incidents. In parallel, the U.S., U.K., France, Japan, and Canada announced a $4.2B plan to expand Western conversion and enrichment. This combination—sanctions plus subsidies—locks in higher Western SWU utilization and price discipline.

Capacity Additions—Yes, but Slow.

1. *Urenco:* escalating a multi-site capacity program (first new U.S. cascades online in 2025), licensing LEU+ (≤10% U 235) from 2025, and taking FID on a U.K. HALEU plant for early 2030s operation. Its order book rose to €18.7bn by end 2024, and management explicitly notes legacy low price contracts weighing margins as new prices reset higher.

2. *Orano*: expanding Tricastin by ~30% this decade and advancing a U.S. facility concept; the EIB lists the enrichment expansion project, signaling institutional support.

3. *Centrus (U.S.)*: produced the first domestic HALEU in 2023; currently sized for ~900 kg/year with DOE as a key counterparty, but expansion requires more capital and long-term offtake. DOE extended the current production phase amid cylinder supply delays—illustrating real world frictions even at small scale.

4. *Laser enrichment (GLE)*: Silex Systems (ASX:SLX) and Cameco (49%) are progressing commercialization pathways (Paducah tails re-enrichment, potential flexible enrichment). If proven at scale, laser routes could add Western SWU with a different cost/footprint profile—but timing and regulatory acceptance remain uncertainties.

Pricing and Contracting: Why the Cycle Has Legs

Historically, western SWU market is imbalanced with a ~6-10 MSWU/yr deficit, traditionally met by Russian imports. We see this deficit providing support for SWU prices going forward.

1. *Price reset*: Spot enrichment at ~$185/SWU and term at ~$166/SWU (Dec 2024) reflect a structural repricing, not a transient spike. Given long build times and decoupling friction, we don't expect rapid mean reversion absent a macro shock to nuclear demand.

2. *Contract tenor*: Western utilities are lengthening terms and diversifying away from Russia, which raises visibility for Urenco/Orano and incentivizes capacity FIDs at rational hurdle rates.

3. *Underfeeding/overfeeding*: If uranium prices stay firm while SWU prices rise, enrichers will keep optimizing tails. That optimization itself changes effective SWU demand—another reason the market can stay tight even before new reactors arrive.

Simple Scenario Map (2025–2035)

Scenario	Policy/HALEU	SWU pricing & supply	Likely winners	What would change our mind
Base	US/EU de-risk from Russia on schedule; DOE HALEU allocations proceed; first advanced reactors late decade	Term pricing stays structurally higher; modest Western capacity adds; spot volatile	Urenco/Orano (pricing power), LEU (option on HALEU)	Evidence of broad waiver use beyond 2027; weak utility contracting
Bull	Big Tech + utilities contract 24/7 nuclear; HALEU deployments accelerate; GLE advances	SWU >$200; order books lengthen; HALEU premiums recognized	LEU, SLX/CCJ via GLE; Urenco HALEU plant FID pipeline	Multiple advanced projects slip; no HALEU offtake; weaker AI load growth
Bear	HALEU delayed to 2030s; sanctions eased; macro power slump	SWU drifts lower but term remains above pre-2022 levels; expansions deferred	Large, investment-grade enrichers via long-term contracts	Evidence of extended Russian imports post-2027; policy back-pedal on nuclear

Bottom Line

If you want AI power exposure with real barriers to entry, don't chase shiny capex stories—position investments in SWU market but, size for volatility, and think in contract cycles, not quarters . Enrichment (SWU) sits at the convergence of technology, geopolitics, and policy. Western supply must grow even without advanced reactors; with HALEU, the SWU intensity multiplies. Prices have started to reset, policy is aligned, and the supply response is measured in years. The asymmetry is obvious: if the market is too tight, prices rise; if advanced reactors slip, Western decoupling and life extension still underpin the floor.

Investment Solution: No Easy Button

For investors seeking SWU exposure, the challenge is that the SWU market offers no liquid financing instruments for investors. Unlike uranium (U_3O_8), which has physical trusts and ETFs (SPUT, URNM, URA), enrichment is a service business dominated by long-term contracts with a handful of players (Urenco, Orano, Centrus). Most are state-owned or privately held, leaving Centrus (LEU) as the only real equity play. No futures, ETFs, or commodity funds exist, reflecting SWU's opaque pricing, regulatory sensitivity, and geopolitical risk.

To bridge this gap, investors should consider two possible structures:

1. *Structured Utility Financing: Monetizing SWU/EUP Inventories*

Nuclear utilities often hold large Enriched Uranium Product (EUP) stockpiles with embedded SWU value that remains illiquid. Investors could partner with them through structured finance deals, funding these inventories in exchange for price-linked returns or equity in their value.

This could take the form of securitizing EUP into asset-backed notes or loans, collateralized by the physical material. Investors gain synthetic exposure to SWU pricing, while utilities access cheaper financing and hedge fuel-cycle risk.

With SWU demand projected to grow 1–3% annually through 2040, such securities offer investors yield linked to enrichment scarcity while giving utilities capital to pre-secure fuel amid geopolitical uncertainty.

2. *Dedicated Investment Vehicle: A Public SWU Fund*

Another approach is creating a closed-end fund, listed trust, or SPV that directly contracts for SWU capacity or accumulates EUP. Modeled after Sprott's U_3O_8 trust, it would pool investor capital to secure enrichment services or stockpiles, then trade on exchanges to provide liquidity.

The fund could contract capacity with suppliers like Centrus or Orano, warehouse EUP, or selectively invest in new enrichment technologies. For investors, it offers rare direct exposure to SWU pricing; for suppliers, it provides committed long-term capital. This vehicle fills the gap left by the absence of enrichment-linked instruments, turning SWU into a tradable asset class while channeling funding into critical nuclear infrastructure.

Both approaches—securitized utility financing and a dedicated SWU fund—fill the gap left by today's absence of enrichment-linked instruments, opening a new asset class for investors while supporting the capital needs of the nuclear fuel cycle.