THIRD WAY

A Three-Pillar Innovation Pathway

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A durable strategy must be pragmatic, politically defensible, and anchored on US competitiveness across the CRM value chain, balancing security with investment credibility. The priority is removing midstream constraints.

The table outlines a three-pillar agenda to strengthen resilience across extraction, processing, recycling, and substitution:

Program	The Problem	Action to Close the Gap
PILLAR I: Extraction & Processing Innovation		
Expand DOE RECOVER Program	The US has vast untapped mineral potential in waste streams, mine tailings, and brines, but no scaled domestic infrastructure to recover it. Overreliance on conventional mining leaves supply vulnerable to permitting delays, price shocks, and FEOC-controlled processing.	The US has vast untapped mineral potential in waste streams, mine tailings, and brines, but no scaled domestic infrastructure to recover it. Overreliance on conventional mining leaves supply vulnerable to permitting delays, price shocks, and FEOC-controlled processing.
Expand National Lab Pilot-Scale Processing Infrastructure	Breakthrough processing technologies developed in US labs routinely fail to attract private investment–not because they don't work, but because they have been demonstrated at pilot scale. Without shared infrastructure for validation, the cost of de-risking falls entirely on developers who can't afford it.	Shared pilot-scale facilities at National Laboratories give companies a federally accessible testbed to validate separation chemistry, continuous processing, and yield optimization before they raise private capital. This directly compresses the timeline from lab breakthrough to investment-ready technology and gives developers proof points that private markets can underwrite.
Establish a Critical Minerals FOAK Validation Program	Even technically validated processing innovations cannot access DOE's Title 17 loan financing until they are demonstrated at commercial scale, creating a funding desert between lab success and bankable deployment. No federal program currently fills this gap specifically for mineral processing.	A dedicated Critical Minerals FOAK validation program would provide milestone-based support to demonstrate yield, cost, energy use, and waste performance at pre-commercial scale–producing the technical track record needed to unlock Title 17 financing and attract private capital. This would directly address the "valley of death" that currently blocks domestic midstream innovation from reaching deployment.

Program	The Problem	Action to Close the Gap
PILLAR II: Recycling & Recovery Innovation		
Expand NETL Critical Minerals Recycling & Recovery R&D	The US has no scaled domestic recycling capacity for most critical minerals. Recovery rates remain low, recycled outputs often fail to meet industrial purity standards, and the absence of process integration means recycled material can't reliably substitute for primary supply in advanced manufacturing.	NETL's Critical Minerals Recycling and Recovery R&D program funds applied research into hydrometallurgical and pyrometallurgical separation, process efficiency, and material purity for lithium, cobalt, nickel, graphite, and REEs. Expanding this program lays the technical foundation for scalable domestic recycling that meets the specifications of battery and magnet manufacturers—reducing reliance on primary extraction and FEOC-controlled refining.
Expand RECOVER Urban Mining & Supply Chain Innovation	The US generates enormous volumes of e-waste and industrial scrap containing recoverable critical minerals—but these streams are fragmented, poorly tracked, and almost entirely excluded from domestic supply chains. Without end-to-end collection and processing infrastructure, this material is either landfilled or exported, often to informal recyclers overseas.	Expanding RECOVER into urban mining and supply chain integration builds the infrastructure to collect, sort, process, and qualify recovered materials for domestic manufacturers. This closes the loop between end-of-life products and new production, turning a fragmented waste problem into a structured, domestic feedstock pipeline and reducing exposure to foreign supply disruptions.
PILLAR III: Refocus the DOE Critical Materials Innovation Hub		
Refocus the DOE Critical Materials Innovation Hub	The DOE Critical Materials Innovation Hub has produced promising substitution research, but that work is not systematically connected to the specific minerals where US exposure is highest or to the defense, energy, and manufacturing sectors that would adopt alternatives. Lab-validated substitutes face no clear pathway to deployment.	Refocusing the CMI Hub around substitution priorities for geopolitically exposed minerals–REEs, gallium, germanium, and cobalt–and establishing direct engagement with defense and energy procurement offices closes the gap between materials research and adoption. Reduces structural demand for the minerals China most aggressively weaponizes.
Establish Strategic Substitution Testbeds	Alternative materials that perform well in lab settings routinely fail to meet the operational tolerances, reliability standards, and qualification requirements of real-world defense, energy, and semiconductor systems. Without applied testbeds, promising substitutes stall at the prototype stage and are unable to earn the system-level approvals that would enable adoption at scale.	Strategic Substitution Testbeds provide applied validation environments where substitute materials are tested against the performance specifications of specific military platforms, energy storage systems, and semiconductor applications. Successful qualification generates adoption pathways and procurement signals that de-risk industry investment in substitute materials and systematically reduce demand for the minerals most vulnerable to Chinese supply manipulation.

Source: Sagatelova, Mary, and Schneider, Dr. Florian A.. "Beyond the Valley of Death: Securing America's Critical Minerals Future Through Innovation". Third Way, https://www.thirdway.org/memo/beyond-the-valley-of-death-securing-americas-critical-minerals-future-through-innovation. Accessed 23 April, 2026.