NEWS RELEASE

Quantum Scale-Up Highlights Strategic Importance of Secure Helium Supply

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Critical Minerals & Resource Dependency
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Accelerating quantum research and development, and translating scientific breakthroughs into economic growth, industrial capability and national security advantage, is now a strategic priority for the United States.

The recent U.S. Executive Orders on quantum computing, quantum sensing, quantum networks and post-quantum cryptography mark another important step in the transition of quantum technologies from research priority to national strategy. As **reported by ABC News**, the orders aim to support development of a quantum computer capable of previously intractable scientific calculations, accelerate quantum-enabled sensors and networks, strengthen domestic quantum supply chains and expand the quantum workforce.

Prior to the signing, White House Director of the **Office of Science and Technology Policy**, Michael Kratsios, said the EOs would "usher in the next frontier of quantum innovation" and call for "the development of the first-ever quantum computer powerful enough for scientific research, initiating a new era of commercial capabilities," adding that such a system is being targeted for completion by 2028.

Industry reaction has been equally positive. Writing in **The Quantum Insider**, **Celia Merzbacher**, Executive Director of the **Quantum Economic Development Consortium (QED-C)**, said the Executive Orders "will help to ensure U.S. leadership through the development and application of quantum technologies for economic and national security," adding that while the industry is rapidly advancing applications across quantum computing, sensing and networking, progress can be further accelerated by "doing what it takes to get systems in the hands of researchers and innovators."

This broader strategic shift is also reflected in the **March 2026 CNAS report**, Quantum's Industrial Moment: Strengthening U.S. Quantum Supply Chains for Scalable Advantage, which states:

"Whether the United States captures quantum's benefits will depend not only on sustained scientific leadership but also on its ability to produce and deploy quantum systems reliably, competitively, and at industrial scale."

The report goes on to identify cryogenics as one of "three enabling-technology areas [that] pose substantial vulnerabilities that risk stalling the development and scale-up of U.S. quantum technologies." It notes that superconducting and semiconducting-spin quantum platforms depend on "extremely low temperatures enabled by dilution refrigerators, with few global providers and reliance on helium-3 gas, an isotope that is scarce, expensive, and tightly regulated."

Recognizing these vulnerabilities, CNAS recommends that the United States "elevate enabling technologies, not just quantum systems, to first-order strategic priorities", alongside building "next-generation cryogenic systems for scalable quantum platforms" and taking steps to "secure and steward critical quantum isotopes and materials." Specifically, the report recommends strategic recovery and recycling, dedicated reserves, and evaluating "additional helium-3 supply pathways, including terrestrial recovery from natural-gas deposits," to help mitigate future supply shocks as quantum deployment scales. **SOURCE: CNAS report, March 2026.**

Cryogenic Quantum Platforms are Closely Linked to Helium Availability

Several of today's leading quantum computing platforms require ultra-low-temperature cryogenic systems. Dilution refrigerators, used to cool quantum processors to temperatures below 10 millikelvin, rely on both helium-4 and helium-3. Helium-4 provides the primary cryogenic cooling medium, while helium-3 is a critical isotope that enables the dilution process required to reach these extreme operating temperatures. While not every quantum architecture has the same cryogenic requirements, superconducting and certain spin-based platforms rely heavily on dilution refrigeration, making helium isotope supply a material consideration for those pathways.

Recent analysis published by India's **Manohar Parrikar Institute for Defense Studies and Analyses** reinforces this point, noting that helium-based cryogenic systems are foundational infrastructure for certain quantum technologies, warning that disruptions to global helium supply represent a strategic vulnerability for nations seeking to develop domestic quantum capabilities.

Helium-3 remains exceptionally scarce, expensive and tightly regulated. Current supply is heavily dependent on helium-3 recovered from tritium decay and other highly constrained sources, including government-linked programs in the United States, Russia and Canada. As quantum technologies continue to scale, governments are increasingly recognizing helium-3 not simply as a specialty gas, but as a strategic quantum-enabling isotope whose

secure stewardship may become important to future technological competitiveness.

As federal support for quantum research and development increases, so too does the demand signal for the enabling technologies and critical materials underpinning quantum infrastructure.

Helium-4 demand is expected to remain closely linked to the deployment of cryogenic systems, quantum laboratories, advanced sensing platforms and semiconductor infrastructure. Helium-3 demand, while far smaller by volume, may become strategically significant because of its scarcity and its currently irreplaceable role within dilution refrigeration systems.

For certain quantum architectures, the race to achieve quantum advantage increasingly extends beyond quantum hardware itself to securing the enabling technologies, specialized manufacturing capability and critical raw materials required to build and operate next-generation quantum systems.

Against this backdrop, primary helium resources located within politically stable jurisdictions are becoming increasingly relevant to national technology strategy. As governments continue investing in quantum computing and associated infrastructure, secure domestic supplies of helium isotopes may become an increasingly important strategic consideration in sustaining long-term technological leadership.

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Marc Farrington
PR & Partnerships
marc@pulsarhelium.com
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Pulsar Helium Inc
Rua Frederico Arouca, nº 251, 2º frente, 2750-356, Cascais, Portugal
connect@pulsarhelium.com

pulsarhelium.com
pulsarhelum.com
Pulsar Helium Inc