House Natural Resources Subcommittee on Oversight & Investigations

Dr. Walter G. Copan
Vice President for Research & Technology Transfer
Colorado School of Mines

"Unleashing American Energy Dominance and Exploring New Frontiers"

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Chairman Gosar, Vice Chair Boebert, Ranking Member Dexter, and Members of the Subcommittee—thank you for the opportunity to testify. It is an honor to join you today.

My name is Dr. Walter Copan, and I lead research and technology transfer at Colorado School of Mines, the world's top university for minerals and mining engineering and rated in the top 3 engineering programs in America. Mines is home not only to the nation's longest-standing mining engineering program, but to comprehensive expertise spanning all energy domains.

I recently served our Nation as Director of the National Institute of Standards and Technology and prior, with two of the U.S. Department of Energy national labs. My leadership experience spans public and private sectors—as an executive, entrepreneur and investor.

Today, the U.S. is falling behind in our aspirations for energy and innovation leadership globally. Sustaining leadership across the technology sectors important

to the U.S. economy and national security requires constancy of purpose, effectively linking investment priorities with our strategic goals.

It is essential to reassess our national portfolio of R&D investments, together with incentives needed to move markets, particularly in a global environment where U.S. technology innovation is challenged and America's influence is threatened abroad. Over the last few months, we have seen new federal investments in important areas—such as AI, quantum, and critical minerals, including the Department of Energy's Mine of the Future initiative. However, we have also seen the termination of many energy-related projects already underway.[1] Importantly this uncertainty has also slowed momentum in workforce development. For taxpayers, these cancellations limit the possibility of seeing returns on investment.

Over many decades, the U.S. has been the undisputed global leader in innovation, but today, by many internationally recognized measures, China leads in 57 of 64 critical technology fields.[2,3,4] China leads in numbers of patents[5] and highly cited research publications in respected journals,[6] while also seeking to dominate global technology standards.[7]

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[1] https://cen.acs.org/business/investment/US-energy-projects-limbo-Trump/103/web/2025/10
[2] Research and Development: U.S. Trends and International Comparisons: https://ncses.nsf.gov/pubs/nsb20246
[3] ASPI's Two-Decade Critical Technology Tracker, https://www.aspi.org.au/report/aspis-two-decade-critical-technology-tracker
[4] State of the Science Address: 2024, https://www.nationalacademies.org/news/2024/06/in-state-of-the-science-address-nas-president-urges-improvements-to-k-12-science-education-in-order-to-strengthen-the-u-s-stem-workforce
[5] https://itif.org/publications/2023/01/23/wake-up-america-china-is-overtaking-the-united-states-in-innovation-capacity/
[6] https://www.nationalacademies.org/news/2024/06/in-state-of-the-science-address-nas-president-urges-improvements-to-k-12-science-education-in-order-to-strengthen-the-u-s-stem-workforce
[7] What Washington Gets Wrong About China and Technical Standards: https://carnegieendowment.org/research/2023/02/what-washington-gets-wrong-about-china-and-technical-standards?lang=en

Today the U.S. is falling behind in key technology sectors including grid reliability and security, renewable energy and energy efficiency, alternative fuels, hydrogen and energy storage. This has created openings for our global competitors to advance, to build their market momentum, and deliver their own messages.[8] China's Xi has stated that China is the consistent partner for nations around the world[9], and that "the world can move on without the United States."[10]

Energy leadership goes well beyond our own borders, with technology domains beyond fossil fuels, geothermal, nuclear, fusion, and critical minerals. The U.S. Geological Survey's Earth MRI program partnership is now generating the modern maps and data America needs to confirm domestic critical-mineral potential. As we discover and rebuild U.S. domestic resources and processing capabilities, international partnerships will remain essential for resilient supply chains. America must re-invest in workforce for the future of energy, materials and innovation leadership. Thanks also to this Committee for your efforts to advance the Mining Schools Act.

The U.S. has benefited enormously from developing new frontiers in energy science and technology. The U.S. had pioneered the full nuclear materials fuel cycle -- and used fuel may once again be reprocessed here. American leadership in solar technologies, nuclear energy and fuel cells have revolutionized space exploration, commerce, and security in space and on earth. We're currently exploring geologic hydrogen production toward limitless affordable energy. We're

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[8] https://www.nytimes.com/2025/10/31/world/asia/china-apec-trump-trade.html
[9] https://english.www.gov.cn/news/202508/30/content_WS68b2f0bbc6d0868f4e8f52f1.html
[10] https://mettisglobal.news/Chinese-President-warns-The-World-Can-Move-On-Without-the-United-States-53149

using AI and quantum computation for grid optimization, to manage risk, and much more.

The U.S. needs a coordinated national minerals and materials strategy rooted in science, economics, and risk assessment. A recent study from Colorado School of Mines researchers shows that the U.S. already has access to most of the minerals and materials we need in existing mining operations, and that byproduct recovery and mine-waste reprocessing offer some of the fastest, lowest-impact pathways to strengthening our domestic supply base. This indicates the U.S. can reduce dependence on critical mineral imports by recovering ore byproducts from active metal mines, and that 90% recovery of these byproducts "could meet nearly all U.S. critical mineral needs."[11,12]

Recycling products and reprocessing our byproducts will be essential parts of the strategy. America will clearly need new mines, and we must develop these more effectively, with improved permitting, deploying innovative technologies, environment protection, and safety. Community engagement and support is essential, with "Good Neighbor Agreements" serving as templates for success.[13]

This strategic framework must evaluate every mineral source, including imports, new domestic mines, byproduct recovery from active mines, recovery from mine waste - including legacy sites; recycling, substitution, and efficiency.

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[11] Byproduct recovery from U.S. metal mines could reduce import reliance for critical minerals; *Science,* DOI: 10.1126/science.adw8997

[12] https://www.washingtonpost.com/opinions/2025/09/01/critical-minerals-rare-earths-recovery/

[13] https://akmininginfo.wordpress.com/resources/strategies/good-neighbor-agreements/

Our nation was built on innovation, energy and mining. Today, these are essential to our economic and national security, and our technological leadership. But the energy, mining and process technologies of the future must be better than the past: economic, cleaner, safer, sustainable, data-driven, and grounded in community partnership.

The U.S. needs a new national compact on natural resources— aligning innovation, workforce, environmental stewardship, and national security. Colorado School of Mines and I stand ready to support this Committee and the nation in building that future.

Thank you. I look forward to your questions.