H.R. 6395, H.R. 8446, AND H.R. 8450

LEGISLATIVE HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND
MINERAL RESOURCES

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

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Tuesday, June 4, 2024
U.S. House of Representatives
Subcommittee on Energy and Mineral Resources
Committee on Natural Resources
Washington, DC

The Subcommittee met, pursuant to notice, at 11:21 a.m. in Room 1334, Longworth House Office Building, Hon. Pete Stauber [Chairman of the Subcommittee] presiding.

Present: Representatives Stauber, Gosar, Webster, Fulcher, Curtis; Huffman, and Kamlager-Dove.

Also present: Representatives Cammack and Ciscomani.

Mr. STAUBER. The Subcommittee on Energy and Mineral Resources will come to order.

Without objection, the Chair is authorized to declare a recess of the Subcommittee at any time.

Under Committee Rule 4(f), any oral opening statements at hearings are limited to the Chairman and the Ranking Minority Member.

I ask unanimous consent that the gentlewoman from Florida, Mrs. Cammack, and the gentleman from Arizona, Mr. Ciscomani, be allowed to participate in today's hearing.

Without objection, so ordered.

I now recognize myself for an opening statement.

STATEMENT OF THE HON. PETE STAUBER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

Mr. STAUBER. Today, the Subcommittee on Energy and Mineral Resources will consider three bills that aim to make the U.S. mineral supply chain as secure as possible.

As projected, global mineral demand is estimated to outstrip global supply in the very near future. We must ensure the United States has ample access to the numerous minerals we rely on every day.

The Energy Act of 2020 defines "critical minerals" as those that are non-fuel mineral or mineral material essential to the economic and national security of the United States, produced from a supply chain that is vulnerable to disruption, and serve an essential function in the manufacturing of a product, the absence of which would have substantial consequences for the U.S. economy or our national security. Every 3 years, the U.S. Geological Survey, or USGS, reviews minerals for eligibility under these parameters, and publishes their determinations on the Critical Minerals List.

The Energy Act of 2020 also directs the Department of Energy to develop a similar list, called the Critical Materials List. Unlike USGS, DOE's methodology is forward-looking, accounting for international demand scenarios and growth trajectories of energy technologies. Independent of USGS, DOE's list includes minerals like copper, electrical, steel, and silicon. Additionally, every mineral on USGS's Critical Minerals list automatically goes on DOE's Critical Materials list.

H.R. 8446, introduced by Mr. Ciscomani, would amend the Energy Act of 2020 to have the list designations work the other way, as well, so DOE's deemed materials automatically go on to USGS's list. While each agency would still be responsible for reviewing elements under their unique purviews, this method could streamline interagency coordination to determine which elements and minerals are most necessary for U.S. national security and economic security.

H.R. 6395, the Recognizing the Importance of Critical Minerals in Health Care Act of 2023, introduced by Mr. Curtis, would add the Department of Health and Homeland Security as a consulting agency for determining the Critical Minerals List.

Minerals are used in a wide range of healthcare applications. For example, radioisotopes from uranium derivatives are used for over 40,000 medical imaging procedures in the United States daily, and liquid helium has no known alternatives for its coolant properties in MRI machines. Copper, gold, lithium, titanium, silver, and platinum are key components for medical technologies, equipment, and treatments, including heart stents, pacemakers, surgical tools, antibiotics, and chemotherapy. By requiring USGS to coordinate with HHS, this bill will ensure that medical uses of these minerals and the ramifications that any supply disruption could have on the healthcare economy are adequately considered when evaluating CML designations.

Our third bill is H.R. 8450, the Phosphate and Potash Protection Act of 2024, sponsored by Mrs. Cammack. In the last few years,

global supply shocks for minerals like potash and phosphate have created uncertainty in the agricultural industry, contributing to rising fertilizer prices. In March 2023, some fertilizer prices spiked to 3.5 times higher than they were just 2 years before. While farmers must initially bear the brunt of cost hikes, price volatility in the fertilizer market can lead to decreased crop production, increased food prices, and greater overall food insecurity, all of which lead to higher prices for American consumers.

H.R. 8450 would direct the Secretary of the Interior, in consultation with the Secretary of Agriculture, to re-evaluate potash, phosphate, and materials necessary for fertilizer for designation as critical minerals.

This bill also requires DOI to publish a report to Congress explaining why these minerals do or do not meet the necessary CML requirements, and to update the CML within 60 days, should USGS find that any mineral meets the criteria.

Just as a periodic table would not be complete without every element in its place, supply shortages, even a single mineral, can jeopardize the well-being of the interconnected global economy and the products and services necessary to make it work.

I look forward to hearing more on the merits of these bills from our witnesses.

I now yield to my good friend, Mr. Huffman for his opening statement.

STATEMENT OF THE HON. JARED HUFFMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. HUFFMAN. Thank you, Mr. Chairman. I am pinch hitting for Ranking Member Ocasio-Cortez this morning, but I want to thank you and our witnesses for being here.

Today, we are discussing three bills, all relating to the Critical Minerals List maintained by USGS.

Congress created the Critical Minerals List to help us better understand which minerals are both critical to the economy and national security, and at risk of supply chain disruption. That is the purpose. This list is a tool that helps decisionmakers prioritize government actions and investments, and other agencies maintain their own lists for their own reasons. And today, we will discuss the Department of Energy's Critical Materials List, for example, which focuses on materials and minerals critical to the energy sector specifically.

USGS's Critical Minerals List and DOE's Critical Materials List may sound similar, and even many of the same minerals could be on both lists, but they were designed for different purposes and should not be used interchangeably. Unfortunately, one of the bills we are here to discuss, H.R. 8446, would do just that. This bill would add DOE's list of energy-specific critical materials to the definition of critical minerals in the Energy Act of 2020, and this may sound innocuous.

This definition, however, drives billions of dollars in Federal investment. Democrats last Congress secured billions of dollars in major bills to invest in securing critical mineral supply chains. These investments target the whole supply chain, from research, to production, to refining, to recycling, to reuse, so any change to the

definition can have cascading effects on our economy, on our environment, and on natural resources.

The Biden administration is investing historic amounts of money in recycling and reuse, investigating alternative minerals and systems, and enhancing mineral efficiency. All of this will help us secure our critical minerals supply chains. But corporate mining interests have their own agenda. And along with their allies in Congress, they are focusing exclusively on a single solution that conveniently lines their pockets: a new domestic mining rush.

The mining industry says we need to rapidly open new mines in the United States to secure our critical minerals supply chains and provide the minerals needed for the clean energy transition. Now, this urgency is used to dismiss the very real concerns of communities across the country who have to live with the reality of mines in their backyards, toxic radioactive dust, polluted lands and waters, and, increasingly, groundwater sucked dry for mining operations.

The climate crisis and trade tensions are used to justify opening new mines while ignoring tribal sovereignty, though most known critical mineral deposits are on or near tribal lands and Indigenous communities have historically borne some of the worst harms of mining.

We should not trade one environmental injustice for another. As policymakers, we must look beyond industry talking points and consider the big picture. As we face a new era of domestic mining, we must overhaul the seriously outdated and inadequate Mining Law of 1872. But stepping back even further, we must consider if each new mine is the best solution to meet our needs. In a world of rapidly changing technologies, what is critical today may not be critical tomorrow. Mines cannot change what minerals they produce to meet market changes, and we can't change our geology to mine materials that we don't have.

So, USGS is important. They have found that the United States does not have known reserves of most of the critical minerals currently on the list, but we can invest in recycling and a circular economy, solutions that could give us much more adaptable, resilient supplies of minerals while causing less environmental harm than new mining. I look forward to hearing from Dr. Phadke about pragmatic alternatives to new mining from her decades of research experience in this field.

Debating whether to invest Federal dollars in new mining or recycling should not affect decisions about which minerals should be considered critical. However, in practice, many of our taxpayer dollars invested in critical mineral supply chains go straight to subsidizing new, primary production. And this is why mining industry lobbyists want their specific minerals added to the list. Designation as a critical mineral means access to that money and other incentives like streamlined permitting for critical mineral projects.

So, one of the bills before us would add DOE's critical materials to the critical minerals list. As I have said, this is a thinly veiled effort to add copper to the critical minerals list, despite USGS's repeated explanations that it doesn't currently fit the peer-reviewed scientific criteria for that list.

H.R. 8540 takes a less prescriptive approach, but still aims to add fertilizer ingredients to the critical minerals list, and boost domestic mining. Copper, phosphate, and potash are undeniably important to our economy, but given incredibly strong domestic production and imports from close allies like Canada, their supply chains are not currently at risk. Legislating and declaring them critical minerals risks siphoning support for more urgent priorities.

With that, I yield back, Mr. Chairman.

Mr. STAUBER. Thank you very much. I will now begin our Members panel who will speak on their specific legislation. I now recognize Mr. Ciscomani from Arizona's 6th Congressional District for his testimony on his bill.

STATEMENT OF JUAN CISCOMANI, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

Mr. CISCOMANI. Thank you, Chairman Stauber, Mr. Huffman, and Subcommittee members, for having me here today to testify on this bill.

I know Director Cabrera will be in the next panel, and I encourage you all to listen closely to his testimony and his expertise on the environmental and critical mineral issues. And his expertise there cannot be overstated. I have worked with Mr. Cabrera for almost a decade, and I have a lot of respect for his work.

And I am excited to see your testimony today as well.

My bill, H.R. 8446, the Critical Mineral Consistency Act, addresses major disparities in our critical mineral supply chain by requiring that the DOI include all DOE critical minerals on their critical minerals list. DOE critical materials are disadvantaged by not being eligible for more extensive benefits targeted to DOI critical minerals.

This legislation will add copper, electrical steel, silicon, and silicon carbide to the USGS Critical Mineral List. As a result, these materials, which are essential to nearly every American industry, will be afforded several benefits, such as eligibility for additional Clean Energy Tax Credits, research grants, and the FAST-41 permitting dashboard.

This critical legislation will improve interagency coordination, help to secure our domestic supply chain, and improve American energy and national security outcomes.

I truly believe this legislation is a common-sense solution that should have bipartisan support, and I appreciate this Committee's consideration of it.

Thank you, Mr. Chair, I yield back.

Mr. STAUBER. Thank you very much for your testimony. We will now move to introduce our second panel of witnesses.

Let me remind the witnesses that under Committee Rules, they must limit their oral statements to 5 minutes, but their entire statement will appear in the hearing record.

To begin your testimony, please press the "talk" button on your microphone.

As you can see, we use timing lights. When you begin, the light will turn green. When you have 1 minute remaining, the light will turn yellow. And at the end of the 5 minutes, the light will turn

red, and I will ask you to please complete your statement at that time.

I will also allow all witnesses to testify before Member questioning.

Our first witness is Dr. Colin Williams. He is the Mineral Resources Program Coordinator for the U.S. Geological Survey in the Department of the Interior, and he is stationed in Moffett Field, California.

Dr. Williams, you are now recognized for 5 minutes.

STATEMENT OF COLIN WILLIAMS, PH.D., U.S. GEOLOGICAL SURVEY, MINERAL RESOURCES PROGRAM, PROGRAM COORDINATOR, MOFFETT FIELD, CALIFORNIA

Dr. WILLIAMS. Thank you, Chairman Stauber and Ranking Member Huffman, for inviting me here today to discuss legislation pending before the Subcommittee. My name is Colin Williams, and I lead the U.S. Geological Survey's mineral resources program.

The USGS is the science arm of the Department of the Interior, and provides impartial, actionable science and data on the energy and mineral resources that underpin the nation's national and economic security. We provide statistics on the domestic and global supply of mineral commodities, map the nation's mineral resources, and provide supply chain analyses informing both policy decisions and Federal and private-sector investment. We also co-chair the National Science and Technology Council's Critical Minerals Subcommittee.

An early accomplishment of the Critical Minerals Subcommittee was to bring together Federal agencies and develop a whole-of-government approach to mineral criticality. The USGS role was to provide the data and supply chain analysis to quantify and model criticality, and the USGS implemented this interagency approach to develop the 2018 list of critical minerals.

The Energy Act of 2020 directed the USGS to update both the methodology and the resulting list of critical minerals every 3 years, beginning with the 2022 list. The Energy Act provided a process for the update that includes interagency consultation and public comment. It defined critical minerals as non-fuel minerals essential to the U.S. economy or national security, with a supply chain that is vulnerable to disruption, and serving an essential function in the manufacturing of a product the absence of which would have significant consequences for economic and national security.

Following the Energy Act cycle, the USGS will next deliver a list in 2025. The updated methodology will incorporate supply disruption scenarios to better represent future risks to supply chains, and to estimate the potential effects of such disruptions to the U.S. GDP.

The USGS is developing other forward-looking approaches to supply chain analysis. We provide additional recycling data in our annual mineral commodity summaries, and we are developing the National Mine Waste Inventory to characterize mineral resources and mining energy waste. We are developing 5-year projections of production capacity as part of our global minerals outlook. And in addition, we have analyzed specific supply chain disruption

scenarios and events, ranging from earthquakes and tsunamis to wars and trade restrictions.

We are also partnering to improve the nation's ability to forecast mineral supply chain disruptions. The USGS and the Energy Information Administration have launched a collaboration in which EIA technology outlooks incorporate USGS supply chain analyses and mineral requirements and market analysis. The USGS is also partnering with the Defense Advanced Research Projects Agency, or DARPA, to develop tools to increase the transparency of critical mineral pricing and improve the accuracy of supply and demand forecasts.

The President's budget request for Fiscal Year 2025 includes an additional $5.6 million to accelerate and expand our supply chain analyses. This increase will enhance our capability to model the economic impact of mineral supply chain disruptions. Such modeling has been in significant demand. For example, over the past year, the USGS has provided the Administration and Congress extensive analysis on China's imposition of export controls on gallium, germanium, and graphite.

In addition, as specified in the budget request, we are restructuring to support the designation of the USGS National Minerals Information Center as a principal statistical unit within the Federal Statistical System.

Turning to the proposed bills:

H.R. 6395. This bill would add the Department of Health and Human Services to the list of agencies the Department of the Interior consults with in designating critical minerals. The USGS supports this bill. A particular strength of the Federal Government's approach to critical mineral issues is interagency collaboration. The USGS welcomes the opportunity to broaden these collaborative relationships by working with HHS.

H.R. 8450. This bill would require an evaluation of potash, phosphate, and other critical fertilizer minerals as critical minerals, as well as an evaluation of associated exploration, development, and production policies. Our testimony focuses only on the critical mineral evaluation portion of this legislation.

The USGS recognizes that potash and phosphate are essential to the U.S. economy, particularly the agricultural sector. Although they did not meet the threshold for inclusion in the 2022 list, both potash and phosphate will be evaluated for the 2025 list. In that light, we believe the legislation is not necessary, since the evaluation will be accomplished this year through the 2025 list development, and we would be happy to work with the Subcommittee on aligning those timelines.

H.R. 8446. This bill would require inclusion of critical materials for energy technologies as designated by the Department of Energy in the list of critical minerals developed by the USGS. The USGS supports efforts to leverage the complementary yet distinct aspects of the two lists. We would, however, appreciate the opportunity to work with the Subcommittee to ensure that the legislation protects the scientific basis of the two component lists.

Thank you again for the opportunity to testify. I will be happy to answer any questions.

[The prepared statement of Dr. Williams follows:]

PREPARED STATEMENT OF DR. COLIN WILLIAMS, MINERAL RESOURCES PROGRAM COORDINATOR, U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

ON H.R. 6395, H.R. 8446, AND H.R. 8450

Chairman Stauber and Ranking Member Ocasio-Cortez, thank you for inviting me here today to discuss legislation pending before the Subcommittee. My name is Colin Williams, and I lead the U.S. Geological Survey's (USGS) national Mineral Resources Program.

Background

The USGS is the science arm of the Department of the Interior and provides impartial, actionable science and data on the energy and mineral resources that underpin the Nation's technological innovation, manufacturing industries, trade, national security, and economy. As part of that role, we are the primary source of statistics on the domestic and global supply of mineral commodities; map and quantify the Nation's mineral resources; and provide supply chain analyses informing both policy decisions and Federal and private sector investment. We also co-chair the National Science and Technology Council's interagency Critical Minerals Subcommittee, which was created in 2010 and authorized in the Bipartisan Infrastructure Law.

The Energy Act of 2020 and the USGS Role in Designating Critical Minerals

An early accomplishment of the Critical Minerals Subcommittee was to bring together the Federal agencies' existing definitions of critical, strategic, and other important mineral commodities and develop a whole-of-government approach to mineral criticality. The USGS' role was to provide the data and supply chain analysis to quantify and model criticality, and to maintain a cross-sectoral focus that could identify commodities with potentially competing supply needs across multiple industries. This interagency approach was implemented by the USGS to develop the 2018 list of critical minerals under Executive Order 13817, A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals.

The Energy Act of 2020 directed the USGS to update both the methodology and the resultant list of critical minerals every three years, beginning with the 2022 list of critical minerals. The Energy Act provided a process for the update that includes interagency consultation and public comment. It defined "critical minerals" as non-fuel minerals essential to the U.S. economy or national security with a supply chain that is vulnerable to disruption and serving an essential function in the manufacturing of a product, the absence of which would have significant consequences for the economic or national security of the United States.

In accordance with the Energy Act of 2020, the 2025 list will include an updated methodology to determine mineral criticality. The methodology will incorporate a data-driven modeling approach to evaluate potential risks to mineral supply chains. The USGS is incorporating supply disruption scenarios into the methodology to better represent possible future risks to supply chains and to estimate the potential effects of such disruptions to U.S. gross domestic product (GDP).

As directed by the Energy Act of 2020, the USGS is developing multiple approaches to forward-looking supply chain analysis. We have expanded our annual Mineral Commodity Summaries to provide additional recycling data, and we are developing the National Mine Waste Inventory to ensure that our understanding of the domestic resource base includes both minerals still in the ground and mineral resources in mine waste and energy waste. We are developing five-year projections of production capacity for publication later this year as part of a global minerals outlook. In addition, we have analyzed scenarios including earthquake risks to specific countries' copper production and processing, the 2010 tsunami's effects on Japanese mineral processing, potential disruption to Russia's supply of six mineral commodities, and the potential impacts of the People's Republic of China (PRC)'s 2010 threat to cut off rare earth supplies.

We are also partnering to improve the Nation's ability to forecast mineral supply chain disruptions. The USGS and the Energy Information Administration (EIA) have launched a collaboration in which EIA is to develop outlooks for specific energy technologies such as electric vehicle batteries, which may be incorporated into USGS cross-sectoral supply chain analyses; and the USGS is to populate those outlooks with mineral requirements, market information, and analysis. The USGS is also partnering with the Defense Advanced Research Projects Agency (DARPA) to develop tools to increase the transparency of critical mineral pricing and improve the timeliness and accuracy of critical mineral supply and demand forecasts.

The President's Budget for Fiscal Year 2025 includes an additional $5.6 million to expand and accelerate our critical minerals supply chain analysis. This increase will accelerate our ability to model the economic impact of time-critical mineral supply chain disruptions for events ranging from earthquakes to pandemics. Such modeling is in significant demand. For example, over the past year, USGS has provided the Administration and Congress extensive analysis on mineral commodity-related issues resulting from the PRC's imposition of export controls on gallium, germanium, and graphite. In addition, we are restructuring our Mineral Resources Program to support an application to the Office of Management and Budget for formal designation of the USGS National Minerals Information Center as a principal statistical unit within the Federal Statistical System. The President's Budget for Fiscal Year 2025 specified that USGS intends to seek this designation and includes a budget restructure that supports the designation.

H.R. 6395, Recognizing the Importance of Critical Minerals in Healthcare Act of 2023

This bill would add the Department of Health and Human Services (HHS) to the list of agencies that the Department of the Interior consults with in designating critical minerals. The USGS supports this bill. A particular strength of the Federal government's approach to critical mineral issues is the effectiveness of interagency collaboration through the Critical Minerals Subcommittee. This interagency input has contributed greatly to cross-sectoral approach to the list of critical minerals. The USGS would welcome the opportunity to broaden these collaborative relationships by working with HHS to further ensure a broad cross-sectoral perspective is reflected in the list.

H.R. 8450, Phosphate and Potash Protection Act of 2024

This bill would require an evaluation, in consultation with the Secretary of Agriculture, of the potential to designate as critical minerals potash, phosphate, and other minerals used in the production of fertilizer. In addition, the Secretary of the Interior would be required to evaluate policies related to the permitting and leasing of exploration, development, and production projects for these minerals. As the USGS does not issue permits or leases or direct economic policy, our testimony focuses only on the critical mineral evaluation portion of this legislation.

The USGS recognizes that potash and phosphate are essential to the U.S. economy, particularly the agricultural sector, but they did not meet the quantitative threshold for inclusion in the 2022 list of critical minerals because more than 75% of potash imports and 80% of phosphate imports come from reliable trading partners. All non-fuel minerals and their supply chains, including both potash and phosphate, will be evaluated as part of the analysis that informs the 2025 list of critical minerals. In that light, the legislation is not necessary because an evaluation of these minerals is already planned. That said, we would like to work with the Subcommittee to ensure the timelines in the legislation align with the ongoing work developing the 2025 list.

The USGS also studies other aspects of these essential minerals. Through the Earth Mapping Resources Initiative (Earth MRI), the USGS is actively studying the potential for critical mineral extraction from phosphate mine waste, and a USGS team recently published a resource assessment for potash in the Elk Point Basin, which spans the U.S.-Canada border, including parts of Montana and North Dakota.

H.R. 8446, To amend the Energy Act of 2020 to include critical materials in the definition of critical mineral, and for other purposes

This bill would require inclusion of critical materials for energy technologies, as designated by the Department of Energy (DOE), in the list of critical minerals developed by the USGS. As a possible way to manage the two lists, the USGS supports this bill. We would, however, appreciate the opportunity to work with the Subcommittee to ensure the legislation protects the scientific basis of the component lists.

Conclusion

Thank you again for the opportunity to testify. I will be happy to answer any questions.

QUESTIONS SUBMITTED FOR THE RECORD TO DR. WILLIAMS, MINERAL RESOURCES PROGRAM COORDINATOR, USGS

Dr. Williams did not submit responses to the Committee by the appropriate deadline for inclusion in the printed record.

Questions Submitted by Representative Westerman

Question 1. In your testimony you say the next critical minerals list will include an updated methodology which will incorporate a forecasting approach, and you specifically mention looking at scenarios involving earthquakes.

1a) How much of a factor will potential natural disasters like earthquakes play in the new forecasting methodology?

Question 2. Dr. Williams, how would adding the Department of Health and Human Services as a coHaborative agency during the Critical Mineral List determination process aide USGS in cross-sectoral examination of the mineral markets?

2a) How would enacting H.R. 6395 aide USGS in its mission to analyze mineral supply chains' role in national and economic security?

Question 3. Dr. Williams, how does the methodology that USGS and DOE each employ to determine their critical mineral and critical material lists differ?

3a) Why is continuing to allow USGS and DOE to each determine eligibility for minerals under their respective purviews, as H.R. 8450 proposes, important?

Questions Submitted by Representative Curtis

Question 1. Reliance on foreign anode suppliers persists, and the U.S. is nearly 100% reliant on imports of anode materials. U.S. leadership in this critical mineral is possible, and ensuring its listing on the USGS list of—criti cal minerals is another market signal and accelerator to showcase our domestic capabilities. Can you discuss the importance of research and development, and the domestic sourcing of these critical minerals, including silicon and silicon carbide in next-generation battery technology?

Mr. STAUBER. Thank you very much. Our next witness is Mr. Misael Cabrera. He is the Director of the School of Mining and Mineral Resources at the University of Arizona, and he is stationed in Tucson, Arizona.

Mr. Cabrera, you are now recognized for 5 minutes.

STATEMENT OF MISAEL CABRERA, DIRECTOR, SCHOOL OF MINING AND MINERAL RESOURCES, THE UNIVERSITY OF ARIZONA, TUCSON, ARIZONA

Mr. CABRERA. Chairman Stauber, Ranking Member Huffman, and members of the Committee, thank you for this opportunity to express my support for H.R. 8446. My name is Misael Cabrera, and I am the Director of the School of Mining and Mineral Resources at the University of Arizona. After over 130 years of preparing students for mining careers, the school was formed to support departments and programs across campus in delivering interdisciplinary innovation in mining and sustainable minerals. Before this appointment, I served as the Director of the Arizona Department of Environmental Quality.

Today, I am not speaking on behalf of the university. My comments are based primarily on nearly 30 years of experience as an environmental professional. I have overseen the drafting of state

rules to protect air, water, and soil, and advocated for the passage of historic state legislation to protect the environment. This career-long commitment to the environment has led me to understand the absolute urgency of having sustainable, abundant, and economic minerals and materials for our planet. This urgency validates the need for both the United States Geologic Survey Critical Minerals designation and the Department of Energy Critical Materials designation.

The difference between the two designations can effectively be summarized in four materials: copper, electrical steel, silicone, and silicon carbide. Copper is essential for generating, transmitting, and storing electricity. Electric steel, an iron alloy, is necessary to operate nearly every electric motor efficiently. Silicone is essential for solar panels, semiconductors, and many alloys, including electric steel. Silicon carbide is a high-performance semiconductor used in electric vehicles, solar inverters, and health monitoring systems.

In short, these materials are fundamental to modern life, our planet's growing population, and the Biden administration's climate agenda.

The distinction between the USGS and DOE criticality assessments is crucial to understanding the value of both designations and the need for H.R. 8446. The DOE designation is forward-looking, incorporating global demand trajectories based on growth scenarios for various energy technologies. On the other hand, the USGS-calculated supply risk is a function of economic vulnerability based on actual, in other words, past, but quantitative production data, the most recent of which was 2018. Both methodologies have merit, as they are transparent and reproducible, just from different vantage points.

The more important but perilous matter is that our nation is precariously reliant on foreign sources of minerals and materials, and our reliance continues to grow. The 2024 USGS Minerals Commodities Report shows that the United States was at least 50 percent import reliant for 41 out of 50 critical minerals. The Minerals Commodities Report also shows that China was the leading critical mineral producing nation, supplying 29 of 43 critical minerals for which data was available. Not surprisingly, China increased its carbon dioxide emissions by over 90 percent from 2005 to 2022, making it the world's largest emitter. The United States reduced its emissions by 17 percent during the same period.

In sum, our lack of investment in critical minerals and materials over the last few decades has led to security concerns, economic insult, and environmental injury for the planet. While investment in critical minerals has been welcome, disparity exists with critical materials. That is unfortunate, given that China is the world's largest producer of silicone, a critical material accounting for approximately 70 percent of the world's production.

It is also unfortunate, given that the International Energy Forum recently published a report estimating that the planet will need six new copper mines annually, and that includes recycling, to meet the net zero goals by 2050.

I support H.R. 8446 because it recognizes that critical minerals and materials designations are complementary in nature, and that

Federal funding should flow to support research, development, and deployment efforts across both domains. By doing so, the United States can strengthen its resilience to supply disruptions and continue to lead in energy innovation and environmental stewardship. Thank you so much.

[The prepared statement of Mr. Cabrera follows:]

PREPARED STATEMENT OF MISAEL CABRERA, DIRECTOR, SCHOOL OF MINING & MINERAL RESOURCES, UNIVERSITY OF ARIZONA

ON H.R. 8446

Chairman Stauber, Ranking Member Ocasio-Cortez, and Members of the Committee thank you for this opportunity to express my support for H.R. 8446.

My name is Misael Cabrera, and I am the Director of the School of Mining & Mineral Resources at the University of Arizona. After over 130 years of preparing students for mining careers, the School was formed to support departments and programs across campus in delivering interdisciplinary innovation in mining and sustainable minerals.

Before this appointment, I served as Director of the Arizona Department of Environmental Quality (ADEQ). During my tenure, the ADEQ team dramatically increased environmental outcomes and was recognized 28 times by local and national organizations. Previously, I held various environmental leadership roles in three international engineering firms.

Today, I am not speaking on behalf of the University. My comments are based primarily on nearly 30 years of experience as an environmental professional. With my hands, I have collected hundreds of environmental samples and designed treatment systems that have removed hundreds of thousands of pounds of pollution from soil and groundwater. I have overseen the drafting of state rules to protect air, water, and soil and advocated for the passage of historic state legislation to protect the environment. This career-long commitment to the environment has led me to understand the absolute urgency of having sustainable, abundant, and economical minerals and materials for our planet.

This urgency validates the need for both the United States Geologic Survey (USGS) critical minerals designation and the Department of Energy (DOE) critical materials designation.

The difference between the two designations can be effectively summarized in four materials: copper, electrical steel, silicon, and silicon carbide.[1] Copper is essential for generating, transmitting, and storing electricity.[2] Electric steel, an iron alloy, is necessary to operate nearly every electric motor efficiently. Silicon is essential for solar panels, semiconductors, and many alloys, including electric steel. Silicon carbide is a high-performance semiconductor used in electric vehicles, data centers, solar inverters, and health monitoring systems. In short, these materials are fundamental for modern life, our planet's growing population, and the Biden Administration's climate agenda.

The distinction between the USGS and DOE criticality assessments is crucial to understanding the value of both designations and the need for H.R. 8446. The DOE designation is forward-looking, incorporating global demand trajectories based on growth scenarios for various energy technologies.[3] On the other hand, the USGS calculated supply risk as a function of economic vulnerability based on actual—i.e., past but quantitative—production data, the most recent of which was in 2018.[4] Both methodologies have merit, as they are transparent and reproducible, just from different vantage points. The more important but perilous matter is that our nation is precariously reliant on foreign sources of minerals and materials, and our reliance continues to grow.

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[1] The Energy Act of 2020, Section 7002 defines Critical Materials as those determined by the Secretary of Energy using certain criteria or a Critical Mineral. In 2023, DOE established 18 critical materials, 14 of which are on the USGS Critical Minerals List.

[2] Cathles, L.M., & Simon, A.C. (2024, May 15). Copper Mining and Vehicle Electrification. International Energy Forum.

[3] Federal Register. (2023, August 4). Notice of Final Determination on 2023 DOE Critical Materials List, Vol. 88(149)., August 4, 2023.

[4] Nassar, N.T., & Fortier, S.M. (2021). Methodology and technical input for the 2021 review and revision of the U.S. Critical Minerals List. U.S. Geological Survey Open-File Report 2021-1045

The 2024 USGS Mineral Commodities Report shows that the United States was at least 50% import reliant for 41 out of 50 critical minerals. The Mineral Commodities Report also shows that China was *the* leading critical-mineral-producing nation, supplying 29 of 43 critical minerals for which data was available.[5] Not surprisingly, China increased its CO_2 emissions by over 90% from 2005 to 2022, making it the world's largest emitter. The US reduced its emissions by 17% during the same period.[6] In sum, our lack of investment in critical minerals and materials over the last few decades has led to security concerns, economic insult, and environmental injury for the planet.

While investment in critical minerals has been welcome, disparity still exists with critical materials. That is unfortunate, given that China is the world's largest producer of silicon, accounting for approximately 70% of the world's production.[7] It is also unfortunate, given that The International Energy Forum recently published a report estimating that the planet will need six new copper mines annually to meet the net zero goals by 2050.[2]

I support H.R. 8446 because it recognizes that critical minerals and materials designations are complementary in nature and that federal funding should flow to support research, development, and deployment efforts across both domains. By doing so, the United States can strengthen its resilience to supply disruptions and continue to lead in energy innovation and environmental stewardship.

QUESTIONS SUBMITTED FOR THE RECORD TO PROFESSOR MISAEL CABRERA, DIRECTOR, SCHOOL OF MINING & MINERAL RESOURCES

Questions Submitted by Representative Curtis

Question 1. Reliance on foreign anode suppliers persists, and the U.S. is nearly 100% reliant on imports of anode materials. U.S. leadership in this critical mineral is possible, and ensuring its listing on the USGS list of critical minerals is another market signal and accelerator to showcase our domestic capabilities. Can you discuss the importance of research and development, and the domestic sourcing of these essential resources, including silicon and silicon carbide in next-generation battery technology?

Answer. Critical minerals and materials are available mainly through the refining of ore. Chrysocolla, a naturally occurring copper oxide ore, cannot be extruded directly into electric wire; quartz, sans an electric arc furnace and further chemical processing, cannot be used to manufacture semiconductors; and hematite, a naturally occurring iron oxide, cannot be used to manufacture efficient motors. A refined material, electric steel, is needed for that. Minerals and materials become critical—in almost every practical modern sense—by reducing ore to near-elemental form through refining. For example, copper used in potable water piping has a purity of 99.9%.[1] Similarly, silicon semiconductors must be more than 99.9999% pure.[2] Further, copper and silicon are also essential to the energy transition. Thus, everyday modern life and decarbonization rely heavily on refining ore.

Given the importance of refining for critical materials and minerals, it is imperative that we invest in research and development for domestic production. A long-standing lack of funding opportunities has unfortunately resulted in critical minerals and materials dominance from an unfriendly global competitor. A recent editorial in *Nature* succinctly captures the urgency of the current situation: ". . . just one country—China—has become the world leader in refining and processing these crucial elements for use in finished products."[3] Further, according to the

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[5] U.S. Geological Survey, 2024, Mineral commodity summaries 2024: U.S. Geological Survey, 212 p., https://doi.org/10.3133/mcs2024

[6] Annual total emissions of carbon dioxide (CO_2), excluding land-use change, measured in tonnes, Our World in Data. https://ourworldindata.org/co2-emissions. Accessed on 6/1/2024.

[7] Newtop Silicone. (n.d.). Silicone Manufacturing in China: A Winning Combination of Cost, Quality, and Expertise. https://www.newtopsilicone.com/silicone-manufacturing-in-china-a-winning-combination-of-cost-quality-and-expertise. Accessed on 6/1/2024

[1] Copper Development Association Inc. "Why Copper." Accessed June 22, 2024. https://www.copper.org/applications/plumbing/water_service/why_copper.html

[2] 7.10: Semiconductor Grade Silicon. "Chemistry of the Main Group Elements (Barron)." LibreTexts. Accessed June 22, 2024. https://chem.libretexts.org

[3] Nature. "Sustainability, Equity and Security at Risk in Rush for Rare-Earth Metals." Nature 619, 436 (2023).

United States Geologic Survey, China was the leading nation, producing roughly two-thirds of critical minerals in 2023.[4] This dominance results in more than just economic and supply chain impacts. In 2022, coal consumption in China, the world's largest CO_2 emitter, increased by 4%.[5] The US decreased coal consumption by 5.5% in the same year.[6]

Domestic research and development for critical minerals and materials is particularly urgent as we innovate during the energy transition. The International Energy Agency reports, "Since 2010 the average amount of minerals needed for a new unit of power generation capacity has increased by 50% as renewables increase their share of total capacity additions. The transition to clean energy means a shift from a fuel-intensive to a material-intensive system." [7]

One of the most significant and mineral-intensive challenges in moving towards renewable energy is storage, i.e., batteries. Domestic research in energy storage and the minerals and materials that enable the technology should be accelerated. For instance, the development of solid-state lithium batteries using silicon as the anode has shown promise, with limited commercial manufacturing already underway. These discoveries could create significant advances in various battery applications.[8] Beyond batteries, the electric vehicle market's expansion has opened new prospects for silicon carbide, given its superior performance in EV inverters and controllers. Silicon carbide provides higher switching frequency, thermal resistance, and breakdown voltage, contributing to higher powertrain efficiency.[9]

As stated during my testimony on June 4, 2024, the four DOE Critical Materials absent from the USGS Critical Minerals List are copper, silicon, electric steel, and silicon carbide. These materials are essential to the energy transition and modern life and require research and domestic supply funding. I applaud the House Committee on Natural Resources for approving H.R. 8446 on June 12, 2024, moving closer to providing equal benefits to both lists.

In conclusion, I encourage Congress to dramatically accelerate research funding of critical minerals and materials, particularly for innovative and sustainable refining methods. For instance, bioleaching, a process that uses microorganisms to extract metals from ores, has shown promise in reducing the environmental impact of traditional mining. Our reliance on critical minerals and materials from foreign refining creates defense insecurity, economic insult, and environmental injury.

Mr. STAUBER. Thank you very much. Our next witness is Ms. Sally Macaluso. She is the Chief Procurement Officer for GE HealthCare, and she is stationed in the great city of Waukesha, Wisconsin.

Ms. Macaluso, you are now recognized for 5 minutes. Welcome.

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[4] U.S. Geological Survey, 2024, Mineral commodity summaries 2024: U.S. Geological Survey, 212 p., https://doi.org/10.3133/mcs2024

[5] Shihui Zhang, Chi Zhang, Wenjia Cai, et al. "The 2023 China report of the Lancet Countdown on health and climate change: taking stock for a thriving future." The Lancet Public Health, Volume 8, Issue 12, 2023, Pages e978-e995. Accessed June 22, 2024. https://doi.org/10.1016/S2468-2667(23)00245-1 (https://www.sciencedirect.com/science/article/pii/S2468266723002451)

[6] EIA. 2023. "Annual Coal Report—Energy Information Administration." Accessed June 22, 2024. https://www.eia.gov/coal/annual/

[7] IEA (2021), "The Role of Critical Minerals in Clean Energy Transitions." IEA, Paris. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

[8] Ye, L., Lu, Y., Wang, Y. et al. "Fast cycling of lithium metal in solid-state batteries by constriction-susceptible anode materials." Nat. Mater. 23, 244-251 (2024). https://doi.org/10.1038/s41563-023-01722-x

[9] NIKKEI Tech Foresight, Battle to secure SiC wafers—power semiconductors for EVS. Accessed June 22, 2024. https://www.coherent.com/news/battle-to-secure-sic-wafers-power-semiconductors-for-evs-en

STATEMENT OF SALLY MACALUSO, CHIEF PROCUREMENT OFFICER, GE HEALTHCARE, WAUKESHA, WISCONSIN

Ms. MACALUSO. Chairman Stauber, Ranking Member Huffman, Chairman Westerman, and Ranking Member Grijalva, thank you for the opportunity to speak to this Subcommittee and testify regarding the important role that critical minerals, elements, substances, and materials play in the medical technology sector.

We appreciate the leadership Representatives Curtis, DeGette, and Fitzpatrick have shown in introducing H.R. 6395, recognizing the importance of the Critical Minerals and Health Care Act, and co-sponsoring it.

GE HealthCare is a leading global medical technology, pharmaceutical diagnostics, and digital solutions innovator dedicated to providing integrated solutions, services, and data analytics to make hospitals more efficient, clinicians more effective, therapies more precise, and patients healthier and happier. With more than 51,000 colleagues globally, we are headquartered in Chicago, Illinois and have manufacturing facilities located in South Carolina, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Utah, Texas, Arizona, New York, and across the globe. GE HealthCare has around a 4 million install base serving patients in every state. And last year, our products and technology served more than 1 billion patients around the world.

GE HealthCare supports the goal of including healthcare sector input when considering the designation of critical minerals, elements, substances, and materials. The bill accomplishes this by including the Secretary of the Department of Health and Human Services, in consultation by the Secretary of the Interior, regarding the designations. Taking into consideration which resources are key to medical technology and patient care will ensure that the country is able to prioritize products which impact millions of patients in the United States and around the world each day. Let me expand on two examples that help to share the important need for interagency communication.

Helium is a chemical element vital to the healthcare system. It is used in magnetic resonance imaging, or MRI, which is a diagnostic test that assists medical professionals by creating very detailed images of structures, including tissues, the skeletal system, and organs inside the human body. There are over 70 million MR scans performed each year globally using GE HealthCare devices in support of critical healthcare needs such as stroke and brain trauma, breast cancer screening, and tumors, among many other usages. MRI systems create these images using large magnets and radio waves. Liquid helium is used to cool the superconducting magnets that are an integral part of the majority of MRs in use today, including those manufactured by GE HealthCare in Florence, South Carolina. The MR industry as a whole accounts for 22 percent of the utilization of the world's supply of helium.

Iodine, a chemical element and one of the heaviest stable halogens, plays an important role in patient care as contrast media in X-ray and computed tomography, known as CT scans, to enhance images for adult and pediatric patients. Healthcare professionals rely on these scans to have clear and accurate images to diagnose diseases and injuries and plan treatments. Annual X-rays

across the world comprise 27 percent of the global usage of iodine across industries. GE HealthCare, as a global leader in X-ray and CT technology, is one of the largest consumers of iodine in the world, where it is used in two GE HealthCare medical contrast products, Omnipaque and Visipaque.

There are a host of other minerals, elements, substances, and materials which hold importance across the medical technology industry, including molybdenum, terbium, lutetium, and germanium. Ensuring the Secretary of the Interior consult with the Secretary of the Department of Health and Human Services during the designation of critical minerals, elements, substances, and materials is appropriate, and will bring a vital perspective to current and future discussions.

Thank you again for your time to share our perspective, and I welcome any of your questions.

[The prepared statement of Ms. Macaluso follows:]

PREPARED STATEMENT OF MS. SALLY MACALUSO, CHIEF PROCUREMENT OFFICER, GE HEALTHCARE

ON H.R. 6395

Dear Chairman Stauber, Ranking Member Ocasio-Cortez, Chairman Westerman, and Ranking Member Grijalva:

Thank you for the opportunity to speak to this subcommittee and testify regarding the important role that critical minerals, elements, substances, and materials play in the medical technology sector. My testimony today is in response to the subcommittee's interest in H.R. 6395, Recognizing the Importance of Critical Minerals in Healthcare Act. We appreciate the leadership Representatives Curtis, DeGette, and Fitzpatrick have shown in introducing this legislation and co-sponsoring it.

GE HealthCare is a leading global medical technology, pharmaceutical diagnostics, and digital solutions innovator, dedicated to providing integrated solutions, services, and data analytics to make hospitals more efficient, clinicians more effective, and therapies more precise, and patients healthier and happier. With more than 51,000 colleagues globally, we are headquartered in Chicago, Illinois and have manufacturing facilities located in South Carolina, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Utah, Texas, Arizona, New York, and across the globe. GE HealthCare has around a 4 million install base serving patients in every state, and last year our products and technology served more than 1 billion patients around the world. GE HealthCare is advancing personalized, connected, and compassionate care, while simplifying the patient's journey across the care pathway. Our Imaging, Ultrasound, Patient Care Solutions, and Pharmaceutical Diagnostics businesses help improve patient care from diagnosis, to therapy, to monitoring.

GE HealthCare supports the goal of including healthcare sector input when considering the designation of critical minerals, elements, substances, and materials. H.R. 6395, Recognizing the Importance of Critical Minerals in Healthcare Act, accomplishes this by including the Secretary of the Department of Health and Human Services in consultations by the Secretary of the Interior regarding the designations.

Taking into consideration which natural resources are key to medical technology and patient care will ensure that the country is able to prioritize products which impact millions of patients in the United States and around the world each day. There are many examples of the important role that more than 50 critical minerals, elements, substances, and materials play in the portfolio of products which GE HealthCare manufacturers to help diagnose and treat patients. Let me expand on two examples that help to share the important need for interagency communication.

Helium is a chemical element vital to the healthcare system. Helium is used in Magnetic Resonance Imaging, or MRI, which is a diagnostic test that assists medical professionals by creating very detailed images of structures, including tissues, the skeletal system, and organs inside the human body. There are over 30 million MR scans performed each year in the United States in support of critical healthcare needs such as stroke and brain trauma, breast cancer screening, and tumors, among many other usages.

MRI systems create these images using large magnets and radio waves. Liquid helium is used to cool the superconducting magnets that are an integral part of the majority of MRs in use today including those manufactured by GE HealthCare in Florence, South Carolina. Helium is extracted from natural gas and produced as a byproduct of natural gas processing from helium rich waste systems. The MR industry as a whole accounts for 22% of the utilization of the world's supply of helium. While the supply of helium is stable today, the availability of supply over the past decade has been inconsistent, and we have established a multi-supplier strategy to ensure security of supply of this critical liquid gas.

This Committee has dealt with helium issues in the past, when over a decade ago it passed legislation that required the privatization of the US Strategic Helium Reserve. The Bureau of Land Management at the U.S. Department of the Interior accepted a bid to purchase the Federal Helium System, and it is important to note that the impact of the sale has yet to be fully seen.

Iodine, a chemical element and one of the heaviest stable halogens, plays an important role in patient care as contrast media in X-ray and computed tomography (CT) scans to enhance images for adult and pediatric patients. Healthcare professionals rely on these scans to have clear and accurate images to diagnose disease and injuries and plan treatment. Annual X-rays across the world comprise 27% of the global usage of iodine across industries. GE HealthCare, as a global leader in X-ray and CT technology, is one of the largest consumer of Iodine in the world where it is used in two GE HealthCare medical contrast products, Omnipaque and Visipaque.

These are two of many examples of the importance of these critical resources for patients. There are a host of other minerals, elements, substances, and materials which are used in medical technology at GE HealthCare including Molybdenum, Terbium, Lutetium, and Germanium.

Accordingly, having the Secretary of the Interior consult with the Secretary of the Department of Health and Human Services during the creation of this list is appropriate and will bring a vital perspective to the discussion.

GE HealthCare supports the legislation, H.R. 6395, Recognizing the Importance of Critical Minerals in Healthcare Act, and commends Representatives Curtis, DeGette, and Fitzpatrick for this effort.

Mr. STAUBER. Thank you very much for your testimony. Our next witness is Mr. Corey Rosenbusch. He is the President and CEO of the Fertilizer Institute, and he is based in Arlington, Virginia.

Mr. Rosenbusch, you are now recognized for 5 minutes. Welcome.

STATEMENT OF COREY ROSENBUSCH, PRESIDENT AND CEO, THE FERTILIZER INSTITUTE, ARLINGTON, VIRGINIA

Mr. ROSENBUSCH. Good morning. Thank you, Chairman Stauber and Ranking Member Huffman.

The Fertilizer Institute is the trade association that represents the fertilizer industry, ranging from manufacturers to distributors to retailers. We have recently taken center stage as the spotlight has been shined on fertilizer's critical role in food and national security. Geopolitical events and significant supply chain disruptions resulted in 300 percent increases in some fertilizer prices, and raised awareness of the mineral resource-dependent materials that fertilizers are.

One of my favorite industry books is "Alchemy of Air" by Thomas Hager, and in the book Sir William Crookes opens the 1898 British Academy of Sciences by declaring, "All civilized nations stand in deadly peril. As mouths multiply, food sources dwindle." At that time, there were only 1.65 billion people on the planet. The only solution that he stated was expansion in the production and availability of fertilizer to enable growing more food without needing more land on which to grow it.

We know that half of the crop yields in this world are attributed to fertilizer use, yet we still face that same food security challenge from 1898. But now the global population is over 8 billion. Science responded to Crookes' call and industry innovated to prevent mass starvation, and today Congress has a similar opportunity to act.

People will often think of fertilizer perhaps as one product, but there are actually many fertilizer materials. And we often reference phosphate, potash, and nitrogen as the three macronutrients, but they are all very different resource-dependent products with very different supply chains. The United States only accounts for about 7 percent of global fertilizer production, and we are a net importer of fertilizer. As a matter of fact, over 90 percent of all fertilizers are actually used outside the United States, making U.S. farmers even more vulnerable to supply shocks.

We are fortunate that we are one of six countries that have both reserves of phosphate and potash, and we must ensure that these critical minerals can be accessed. Deficiencies in any of these nutrients will lead to crop yield failure, and our global partners have recognized that. Both Canada and the European Union have put these minerals on their own critical minerals list.

The USGS states that critical minerals must be essential to the economic or national security of the United States and have supply chain vulnerabilities. Yet in 2022, both minerals were left off the list. We must note that in 2022 that list was released 2 days prior to Russia invading Ukraine, and you will understand why that is significant as we look at each of these two minerals briefly.

First, phosphates. There are only 11 major phosphate-producing countries in the world. The largest producer is China, with 42 percent, and Morocco is second, with 16 percent of production. These two countries together hold about 80 percent of the world's reserves of phosphates, yet China only accounted for about 20 percent of exports because of their policy restricting exports of the product. Likewise, Russia, the world's largest supplier of fertilizer, was responsible for 14 percent of phosphate exports, but that was before it invaded Ukraine.

The USGS focuses its analysis on phosphate rock, yet phosphate rock is not in a form that can be used by the plant. It must be processed into phosphate fertilizer. We frequently import phosphate fertilizers to meet our farmers' demand, somewhere between 20 and 27 percent in recent years. Yet, that is excluded from their analysis.

And permitting is perhaps our biggest challenge to accessing these minerals. One recent permitting example of a phosphate mine in Idaho required 10 years and $36 million to complete.

As we look at potash, Belarus and Russia represent about 40 percent of global potash production. Sanctions on Belarus and, of course, Russia invading Ukraine greatly impacted their availability. We are fortunate that we do indeed get 80 percent of our potash from Canada. However, Canada is not immune from supply chain disruptions. For example, in 2023, we curtailed shipments and production of potash because of a dock worker strike.

On behalf of the fertilizer industry, we thank Mrs. Cammack and Ms. Slotkin for their leadership on these bills. You can see that phosphate and potash are globally traded commodities that have

experienced significant supply chain shocks. And most importantly, they should be included on the critical minerals list because food security is national security.

[The prepared statement of Mr. Rosenbusch follows:]

PREPARED STATEMENT OF COREY ROSENBUSCH, PRESIDENT AND CEO, THE FERTILIZER INSTITUTE

ON H.R. 8450

Good morning, Chairman Stauber, Chairman Westerman, Ranking Member Ocasio-Cortez, Ranking Member Grijalva, and members of the subcommittee. My name is Corey Rosenbusch, President and CEO of The Fertilizer Institute (TFI).

TFI represents companies engaged in all aspects of the fertilizer supply chain from manufacturers to distributors to retailers. The fertilizer industry ensures that farmers receive the nutrients they need to grow the crops that feed our nation and the world.

I want to thank the subcommittee for holding this hearing and providing the opportunity to discuss the bipartisan H.R. 8450, the Phosphate and Potash Protection Act of 2024, introduced by Representatives Cammack and Slotkin.

Phosphate and potash and are two of the three most common forms of fertilizer, along with nitrogen. Phosphorus is present in every living cell, both plant and animal. Phosphate (P) is crucial to key energy reactions in plants, including photosynthesis, speeding maturity and reproduction, and increasing yield. Phosphorous deficiency has been cited as a key cause for below-optimum crop yields.[1] The European Union includes phosphate on its critical raw materials list.[2] Potash (K) is particularly important for high-carbohydrate crops like potatoes, sugar beets, and grapes. It also provides plants with starch, enabling them to resist wilting and survive winter conditions.[3] Canada includes potash on its own critical minerals list.[4]

The book *Alchemy of Air* by Thomas Hager begins with an account of Sir William Crookes opening an 1898 meeting of the British Academy of Sciences by dramatically declaring that "all civilized nations stand in deadly peril." Having achieved the desired effect of shocking his audience into paying attention, Sir William went on to state: "As mouths multiply, food sources dwindle." He noted how recent advances in public health and medicine had significantly extended life spans. But, he also foresaw uncontrollable population growth, soil infertility due to overuse on limited available acreage for farming, and, ultimately, mass global starvation. At that time, the world population stood at approximately 1.65 billion people.

The only solution, he said, was extraordinary expansion in the production and availability of fertilizer to enable growing more food without needing more land on which to grow it.

Today, half of all global crop yields can be attributed to fertilizer use[5] at a time when the world's population exceeds 8 billion people and is forecasted to surpass 9.5 billion people by 2050.

H.R. 8450, "Phosphate and Potash Protection Act of 2024 "

The U.S. fertilizer sector, an industry supporting 487,000 American jobs with annual wages in excess of $34 billion, thanks Congresswoman Cammack for her leadership and supports her bill, H.R. 8450, which would require the United States Geological Survey (USGS) to conduct a timely review for adding phosphate and potash to the Critical Minerals List and report back to key committees of jurisdiction on the issue.

The U.S. and Global Fertilizer Industry

The modern fertilizer sector is a highly competitive global industry with more than 60 countries engaged in the production of fertilizer; one-third of those countries have three or more fertilizer-producing entities. In addition to competition, the fertilizer industry is also subject to international markets, geopolitical pressures,

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[1] Fertilizer 101: Nourish, Replenish, Grow, pp 28-30, Copyright 2010. The Fertilizer Institute.

[2] An extractive bioeconomy? Phosphate mining, fertilizer commodity chains, and alternative technologies/Sustainability Science (springer.com)

[3] Id. at Fertilizer 101, p. 31.

[4] The Canadian Critical Minerals Strategy—Canada.ca

[5] Stewart, W.M., Dibb, D.W., Johnston, A.E. and Smyth, T.J. (2005), The Contribution of Commercial Fertilizer Nutrients to Food Production. Agron. J., 97: 1-6. https://doi.org/10.2134/agronj2005.0001

and weather events. In some instances, a fertilizer-producing organization may be a state-run entity with lower worker safety and environmental standards or even with an eye towards tilting the global economy.

The U.S. fertilizer market only accounts for the production of about 7% of all global fertilizer. We are a net importer. Production is just one part of the story, as exports and usage are also key considerations. More than 90% of global nutrient use currently occurs outside the United States (although last year the U.S. was responsible for 16% of global grain and 19% of global oilseeds production according to the U.S. Department of Agriculture). The two largest users of fertilizer are China and India,[6] and demand continues to grow across emerging economies in Latin America, Asia, and Africa. As the attached International Fertilizer Association (IFA) map of trade routes at the end of this document indicates, the global fertilizer industry is, not surprisingly, heavily dependent on international trade and supply chain logistics.

IFA projects that by 2027 global consumption of phosphates usage will grow by 12%, primarily due to increased needs in Africa and West Asia, while potash usage will grow by 17%, driven by Belarussian trade with China.[7]

All of these factors combine to impact supply and demand, both domestically and globally. Prices for fertilizer here in the U.S. are unavoidably linked to global prices. In turn, this has a tremendous effect on food availability and food security in the U.S. and throughout the world.

The Energy Act of 2020 defines a "critical mineral" as a non-fuel mineral or mineral material essential to the economic or national security of the U.S. and which has a supply chain vulnerable to disruption. Critical minerals are also characterized as serving an essential function in the manufacturing of a product, the absence of which would have significant consequences for the economy or national security. My testimony this morning will clearly outline how both phosphate and potash meet the criteria established in The Energy Act of 2020. After all, food security IS national security.

Inclusion of phosphate and potash on the USGS Critical Minerals List is all about contingency planning for the future. Contingency planning is appropriate to deal with unforeseeable disruptions as the pandemic, global supply chain challenges, foreign export limitations, sanctions, and wars over the last four years combine to demonstrate.

The USGS Critical Minerals List

The USGS quantitative methodology is based on an approach that defines supply risk as the confluence of three factors: (1) the likelihood of a foreign supply disruption; (2) the dependency of the U.S. manufacturing sector on foreign supplies; and, (3) the vulnerability of the U.S. manufacturing sector to a supply disruption.

Although potash appeared on the 2020 USGS Critical Minerals List, both phosphate and potash received low scores for supply risk and trade exposure in the most recent USGS Critical Minerals List and were left off. Note that the 2022 Critical Minerals List was released just two days before Russia invaded Ukraine in February of that year, greatly disrupting international fertilizer markets and exports to the U.S.

Further, despite much evidence to the contrary, USGS in recent comments continues to insist phosphate and potash are not subject to supply chain vulnerabilities.

Phosphate

Under the three-pronged test for inclusion on the Critical Minerals List, the first two prongs regarding likelihood of a foreign supply disruption and the U.S. degree of dependence on foreign supply are clearly met and should be given significant weight. The U.S. Government itself has stated that supply chain disruptions are common, which clearly effects manufacturing, meeting the third part of the Critical Minerals List test.

According to industry statistics, there are only 11 major phosphate producing countries globally. U.S. phosphate production is not insignificant, currently providing 9.6% of global production according to the USGS.[8] But, it is well below that

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[6] Impacts and Repercussions of Price Increases on the Global Fertilizer Market/USDA Foreign Agricultural Service

[7] International Fertilizer Association, "Helping to Feed the World Sustainably: Public Summary Medium-Term Fertilizer Outlook 2023–2027,"pp. 4-6, June, 2023

[8] U.S. Geological Survey. Mineral commodity summaries 2023. (U.S. Geological Survey, 2023).

of countries such as China (42%) and Morocco (15.9%) for global production. Those two countries combine to hold 80% of the world's reserves.[9]

Further, as noted above, exports and usage are also key considerations. Some phosphate-producing countries consume a large portion of their production domestically, significantly impacting global availability and prices. Although it presently comprises more than 40% of global production, China accounted for only just over 20% of the world's exports in 2022 due to its recent effort to stabilize its own domestic supply of fertilizer by limiting exports. China's policy of export quotas greatly impacted global supply. China had previously constituted about 30% of total world trade according to Chinese customs data.[10] During this time, China reduced the sale of its phosphate fertilizers to Brazil, one of its leading customers, by 50%.[11] In turn, this required Brazil, an emerging economy, to seek phosphate fertilizers elsewhere, only further disrupting global supply and driving up prices. Likewise, before Russia invaded Ukraine, Russia constituted as much as 14% of global exports.[12] In the first three months after the invasion, prices for phosphate rock spiked by 38%.[13] More recently, Russia has imposed its own export quotas.

At this time, none of the announced capacity expansions to phosphate rock production are occurring in the United States. According to IFA, significant new mining projects planned for completion by 2026 are occurring in Morocco, Brazil, India, Egypt and Australia. Significant new mining projects planned for completion after 2027 are under development in China, Tunisia, Saudi Arabia and Australia. The global average build cycle for adding substantial new capacity is four-to-five years. In the U.S., it's longer. A permitting effort at an Idaho-based phosphate mine required 10 years and tens of millions of dollars.

In the absence of available phosphate from countries such as China and Russia, USGS states that 98%[14] of U.S. phosphate rock imports are now sourced from Peru, a country with which the U.S. has a free trade agreement (FTA). The implication is that availability of Peruvian phosphate makes it unnecessary to include phosphate on the Critical Minerals List. However, Peru lacks a sufficient store of reserves to ensure future availability; its 2022 output accounted for only 1.9% of global production. Further, when comparing the 2014 USGS Phosphate report[15] with the 2023 USGS report,[16] Peruvian phosphate reserves have declined by nearly 75% over the last decade, falling from 820,000 in 2014 to 210,000 in 2023. Meanwhile, the largest investor in the Peruvian mining industry across the range of sectors is China.[17] So, the U.S. is dependent on getting nearly 100% of its phosphate imports for domestic production from a country that currently generates less than 2% of the global market, has diminishing reserves, and is heavily dependent on Chinese investment.

Further, regarding U.S. vulnerability to supply chain disruption, the Environmental Protection Agency (EPA) says in a study of phosphate availability, "Agricultural use of phosphate-based fertilizer, trade disputes, and reliance on a small number of countries for imports have led to limited supply and dramatically increased price of phosphate rock." EPA goes on to say, "There have been historic widespread supply disruptions due to decreased production in countries that are significant suppliers to the international market. Supply disruptions have impacted availability of derivative products".[18]

In fact, although USGS focuses on imports of phosphate rock, the rock by itself is not fertilizer; it must be converted to fertilizer in the U.S. manufacturing process. Without the availability of phosphate especially due to supply chain disruptions, maintaining the scale of U.S. processing of triple superphosphate (TSP),

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[9] NATIONAL SCIENCE AND TECHNOLOGY COUNCIL, SUBCOMMITTEE ON CRITICAL AND STRATEGIC MINERAL SUPPLY CHAINS, *Assessment of Critical Minerals: Screening Methodology and Initial Application ix*, 7-10 (March 2016), available at https://www.whitehouse.gov/sites/whitehouse.gov/files/images/CSMSC%20Assessment%20of%20Critical%20Minerals%20Report%202016-03-16%20FINAL.pdf.

[10] China issues phosphate quotas to rein in fertiliser exports—analysts/Reuters

[11] China reduces fertilizer exports to Brazil in 50% this year/Agribusiness/valorinternational (globo.com)

[12] High fertilizer prices contribute to rising global food security concerns/IFPRI: International Food Policy Research Institute

[13] USDA ERS—Global Fertilizer Market Challenged by Russia's Invasion of Ukraine

[14] Mineral Commodity Summaries 2024 (usgs.gov)

[15] Phosphate Rock (d9-wret.s3.us-west-2.amazonaws.com)

[16] Phosphate Rock (usgs.gov)

[17] Evan Ellis, The Evolution of Peru's Multidimensional Challenges, Part III: Engagement with China, Global Americans (August 3, 2022), https://theglobalamericans.org/2022/08/the-evolution-of-perus-multidimensional-challenges-part-iii-engage-ment-with-china/#:~:text=By%20the%20end%20of%202021,percent%20of%20its%20copper%20output.

[18] Water Treatment Chemical Supply Chain Profile-Phosphate Rock (epa.gov)

diammonium phosphate (DAP), and monoammonimum phosphate (MAP) is not possible. Separately, the U.S. frequently imports phosphate-processed fertilizers. According to industry statistics, the U.S. imported 27% of its phosphate fertilizer in 2021 and 20% in 2022 used to satisfy American farmer needs. In 2022, four countries, Morocco (27%), China (21%), Russia (16%), and Saudi Arabia (15%), accounted for nearly 79% of processed phosphate exports.

Potash

Again, applying the three-pronged test for inclusion on the Critical Minerals List regarding the likelihood of a foreign supply disruption, the U.S. degree of dependence on foreign supply, and the potential impact on U.S. manufacturing are all clearly met.

U.S. production is globally insignificant at only 1% of global mine production, according to industry figures. Global potash production is extremely concentrated with 10 countries combining to produce over 92% of the world's supply; two-thirds of the world's potash supplies come from just three countries Canada, Russia, and Belarus.[19] At present, U.S. sanctions on Belarus combined with the impacts of Russian aggression in Ukraine have greatly impeded the availability of potash from these sources. As USGS itself has said, "supply uncertainty from . . . Belarus and Russia caused potash prices to rise in the first half of 2022."[20] By some estimates, global pricing for potash increased by 500% over the previous year due to Russia's invasion of Ukraine, among other factors.[21]

Importing more than 80% of our potash from Canada, the U.S. is the third largest global importer at 17%, trailing only the developing economies of Brazil (23%) and China (18%) according to industry statistics. Once again, China is a major producer, accounting for 12% of the global supply, but it is not a significant exporter.[22] Meanwhile, Israel is in the top four of exporting countries even though it provides only 6% of global production; nevertheless, Israel is currently at war. Canada, Russia, Belarus and Israel, accounted for over 80% of Potash global exports.[23]

At this time, none of the announced capacity expansions to potash production are occurring in the United States. According to IFA, significant new mining projects planned for completion by 2026 are located in Laos, Canada, Russia and Jordan. Significant new mining projects that are planned for completion in 2027 and beyond exist in Canada, Spain and Belarus. The global average build cycle for adding substantial new capacity is eight-to-10 years.

All three prongs on the USGS Critical Minerals List criteria are met. As USGS declared in a recent press release, "According to a recent USGS global assessment of potash resources, the costs of importing potash long distances can limit its use and imports are subject to supply disruptions,"[24] which satisfies the first prong. As concerns the need for dependence on foreign supply under the second prong, USGS also stated, "some (U.S.) regions lack potash deposits needed for optimal food crop yields."[25]

The U.S. currently imports nearly all of its potash, getting it primarily from Canada, a country with which the U.S. enjoys strong trade relations. However, even Canada is not immune to supply chain disruptions. During the pandemic, the Biden administration was forced to impose cross-border vaccine requirements, which impeded truck traffic. Moreover, in its 2024 USGS Potash report, USGS notes that "production in Canada was lower in part owing to a dock workers strike in July 2023 that curtailed shipments of potash from the port of Vancouver, British Columbia. This led to temporary closures of some mines in Canada. Production resumed at those mines after the strike was settled in August."[26] This disruption lasted fewer than two months. Still, Canada's potash production declined 11% in 2023 relative to 2022. Now, Canada faces the possibilities of mid-summer strikes involving rail workers as well as workers in its west coast ports and at the Port of Montreal.

Finally, regarding the third prong, lack of availability of potash to U.S. manufacturers negatively impacts fertilizer production. Potash goes into important plant

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[19] Impacts and Repercussions of Price Increases on the Global Fertilizer Market/USDA Foreign Agricultural Service

[20] Mineral Commodity Summaries 2024 (usgs.gov)

[21] Potassium Depletion: The Invisible Threat to Global Food Security (scitechdaily.com)

[22] Potash facts (canada.ca)

[23] *Id*. Canada (46%), Russia (17%), Belarus (10.7%) and Israel (7.6%), respectively

[24] Plenty of Potash, but Some Regions Lack Low Cost Sources for Crop Production/U.S. Geological Survey (usgs.gov)

[25] Id.

[26] Mineral Commodity Summaries 2024 (usgs.gov)

nutrients such as potassium chloride, potassium nitrate, and potassium sulfate, among other potash-based fertilizers.

Conclusion

Thank you again for the opportunity to be with you all this morning. On behalf of the fertilizer industry, thanks as well to Ms. Cammack and Ms. Slotkin for leading on H.R. 8450.

Contingency planning is appropriate to deal with unforeseeable disruptions, including supply chain disruptions of imports, impacting U.S. manufacturing. And, in this case, on disruptions that impact U.S. crop yields and food security. Whether it be food security, national security or commercial reliance, phosphate and potash are both essential nutrients that American farmers depend upon to reliably and sustainably meet the country's food security requirements. They should be included in the Critical Minerals List.

I am happy to answer any questions.

Mr. STAUBER. Thank you very much. Our next witness is Dr. Roopali Phadke. She is a Professor of Environmental Studies at Macalester College, and she is based in the great city of Saint Paul, Minnesota.

Dr. Phadke, you are now recognized for 5 minutes.

STATEMENT OF ROOPALI PHADKE, PH.D., PROFESSOR OF ENVIRONMENTAL STUDIES, MACALESTER COLLEGE, SAINT PAUL, MINNESOTA

Dr. PHADKE. Thank you, Chairman Stauber, Representative Huffman, and distinguished members of the Subcommittee. Good morning. I am from the great city of Saint Paul. Thank you for inviting me to discuss critical minerals policy. My name is Roopali Phadke. I am a Professor of Environmental Studies at Macalester College in Minnesota. For the last 25 years, my research has focused on energy infrastructure. For the last 10, I have studied critical minerals policy. The views I share here are my own. My testimony draws in particular from my experience in Minnesota.

H.R. 8446 proposes to amend the Energy Act to include critical materials in the list of critical minerals. As we have heard, the list maintained by USGS and by Commerce, State, and Energy Departments have been designed for different purposes, they draw on different methodologies and forecasting techniques.

The DOE Critical Materials List is specifically aimed at the energy sector. It is not interchangeable with the economy-wide Critical Minerals list. These lists matter because they inform strategic national policy and agency investments, and to date they have been used to privilege primary extraction.

Mining is often posed as the only solution to the clean energy transition, but it has an immense cost to communities and the environment. Far less attention and investment has focused on the recovery and recycling of metals that are already above ground. They are all around us in this room. They are in our laptops, our phones, AirPods. I don't know if many people know that vapes are, in fact, one of the worst kinds of e-waste.

I want to focus on three reasons why we need to invest in the circular economy and demand-side management. The first is the environmental harm caused by improper disposal, the second is the cost of inaction, and the third is the lost economic value.

The abundance of critical minerals in our waste streams challenges arguments about scarcity. The 2024 Global E-Waste Monitor reported that the world's generation of e-waste, including phones, appliances, basically anything with a cord and a circuit board, is rising five times faster than recycling. The global average annual e-waste generated per capita is about 17 pounds. In the United States, it is a staggering 46 pounds per capita per year.

Each of us probably has a drawer at home full of e-waste, and it is because no one knows what to do with it. My state home in Minnesota can provide a case study. Though we are considered among the top states in the United States in terms of our recycling of e-waste, we collect only 20 percent. If it is not in a drawer, it is landing in a landfill, where e-waste is leaching toxins into the soil and water.

There is a real cost to improper disposal, especially in the form of devastating infrastructure losses each year from battery fires. In Minnesota, the City of Blaine lost a $20 million transfer station due to a battery fire in 2018. Rice County in Minnesota, the Rice County Landfill had a battery fire that burned for almost a week straight last year. Similar examples exist nationwide. This is a tremendous lost opportunity because there is economic value in this waste. The metals in e-waste are worth $91 billion globally.

Finally, recycling critical minerals creates jobs. My colleagues and I have calculated that the average 267 million pounds of e-waste that is generated annually in Minnesota alone could create 1,700 new jobs. This includes work in collection, de-manufacturing, shredding, IT asset collection, and refurbishing.

In conclusion, a clean energy economy requires the Federal Government to invest in the circular economy of critical minerals because it is the most pragmatic, just, and timely way to ensure responsible supply chains. While the DOE has begun investing in R&D work, it is paramount that Congress continue to support these efforts through policies like extended producer responsibility, reuse in design, and a Federal ban on landfilling e-waste. Currently, there are 17 states that have that policy in place.

I appreciate the opportunity to provide this statement and I look forward to engaging with the Committee.

[The prepared statement of Dr. Phadke follows:]

PREPARED STATEMENT OF ROOPALI PHADKE, PH.D., PROFESSOR, DEPARTMENT OF ENVIRONMENTAL STUDIES, MACALESTER COLLEGE

ON H.R. 8446

Chairman Stauber, Ranking Member Ocasio-Cortez, and distinguished members of the subcommittee, good morning. Thank you for inviting me to discuss critical minerals policy.

My testimony represents my views only and reflects my decades of scholarship as a Professor of Environmental Studies at Macalester College in Minnesota. My background is in environmental policy, with a focus on energy and water issues. For more than 25 years, my research has focused on energy infrastructure development and public engagement in technology design. For the last 10 years, I have studied critical minerals with attention to both the challenges of increasing primary extraction and the opportunities that come with greater investments in a circular economy approach. I'm grateful that my research has been supported by federal agencies including the National Science Foundation, NOAA, the Department of Energy, and private foundations. My testimony draws in particular on my experience in Minnesota.

Adequate supplies of critical minerals are key to achieving the climate policy goals asserted by the Biden-Harris Administration. H.R. 8446 amends the Energy Act of 2020 to include critical materials in the list of critical minerals. The lists maintained by USGS and the Commerce, State and Energy Departments, have been designed for different purposes, and draw on different methodologies and forecasting techniques. The DOE critical materials list is specifically aimed at the energy sector and agency priorities; it is not interchangeable with the economy-wide critical minerals list.

These lists matter because they inform strategic national policy and agency investments. They have justified Executive Orders, new grants programs and tax credits. In effect, they have been used to privilege primary extraction.

I do not believe that categorization and classification is where Congress should be focusing its critical minerals policy attention. Despite the interventions of the last three Presidential administrations to categorize minerals to stimulate development, there has been little success in re-establishing a U.S. critical mining sector. Primary extraction may not be the most responsible method for sourcing minerals for important technologies including batteries, solar panels, and wind turbines. Instead, I urge Congress to prioritize development of a robust circular economy of metals.

Critical minerals mining is often posed as a necessary requirement for the clean energy transition. The challenges to opening up new mines have been well documented, including how and why local communities respond adversely to new mining proposals.[1] This challenge is partly rooted in the mining sector's poor sustainability record globally, and in the U.S. Mining is one of the world's most carbon-intensive sectors. In 2019, the Rocky Mountain Institute estimated that the production of industrial metals accounted for over 10% of global greenhouse gas emissions.[2] Similarly, the International Energy Agency found that the waste generated per unit of mineral produced increased by over 20% from 2019 to 2022, and water consumption increased by around 25% during this period.[3] In 2022, the EPA reported that the mining sector accounted for 44% of reported national toxic releases.[4] Cleanup of the approximately half million abandoned hardrock mines in the U.S. is estimated by the EPA to cost more than $35 billion.[5]

This immense environmental footprint, combined with the challenges incumbent in building out new mines, suggests it's high time to shift critical minerals policies toward more responsible sourcing that does not rely on primary mining. Far less attention and investment has been given to the recovery and recycling of metals from waste streams, including consumer electronics, landfills and legacy mines. While the Department of Energy has begun investing in R&D work in this area, it is paramount that Congress continue to support these efforts.

In the testimony that follows, I describe how circular economy and demand side management strategies can create resilient supply chains by limiting import dependence, while also reducing the negative impacts on air, soil and water from

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[1] Owen, J. et al. 2022. "Fast track to failure? Energy transition minerals and the future of consultation and consent," *Energy Research & Social Science*, 89: 102665.

[2] https://rmi.org/insight/low-carbon-metals-for-a-low-carbon-world

[3] https://www.iea.org/reports/global-critical-minerals-outlook-2024/market-review

[4] https://www.epa.gov/trinationalanalysis/metal-mining

[5] https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20004GRW.TXT

primary extraction. This approach can also produce new employment opportunities while upholding the sovereignty of Tribes whose lands are in close proximity to mining operations.

The below sections focus on: 1) Developing robust circular economy systems and demand side approaches, 2) Reforming the Mining Law of 1872, and 3) Strengthening FPIC (Free, Prior and Informed Consent) requirements, especially as it relates to Tribal communities.

1) Developing robust collection systems and demand side approaches

The abundance of critical minerals in our waste streams challenges arguments on scarcity. The UN's fourth Global E-waste Monitor reported that the world's generation of e-waste, including mobile phones, home appliances and anything else powered by electricity, is rising five times faster than documented e-waste recycling. They estimate the annual generation of e-waste is rising by 2.6 million tons annually, on track to reach 82 million tons by 2030.[6] The global average annual e-waste generated per capita is 16.8 lbs, but in the U.S. it's a staggering 46 lbs per capita.

Urban mining and landfill mining can make a critical contribution to the circular economy of metals. Whereas "urban mining" has been used to describe the process of recovering e-waste found above ground in our homes and communities, landfill mining recovers materials from both active and inactive waste facilities. A report from the highly regarded Belgian university KU Leuven argued that "Recycling is Europe's main opportunity to improve its long term self-sufficiency and could provide 45–65% of Europe's base metal needs by 2050". They also write that metals recycling, on average, saves between 35% and 95% of the CO2 compared with primary metals production.[7]

When e-waste isn't properly disposed of it ends up in landfills, where the EPA estimates it contributes 70% of all toxic metals pollution, despite making up 2% of the total weight present in landfills. My home state of Minnesota can provide a case study. Though we are considered among the top states in terms of e-waste recycling, the Minnesota Pollution Control Agency's 2022 SCORE data suggests we collect only 20% of our e-waste. Most of the rest ends up in landfills where it leaches toxins into soil and water.

There is also a cost to this inaction. Improperly collected e-waste totals millions of dollars each year in lost business income and local tax expenditures. In 2018, the U.S. Consumer Product Safety Commission reported more than 25,000 battery fire or overheating incidents involving consumer products in a five-year period.[8] Waste industry leaders report devastating infrastructure losses each year to battery fires. In Minnesota, the city of Blaine lost a $20 million transfer station due to a battery fire in 2018. In another Minnesota example, the Rice County landfill had a battery fire that burned for almost a week straight last year. Similar examples exist nationwide.

This is a tremendous lost opportunity because there is economic value in this waste, whether it comes from consumer devices, landfills or legacy mine waste. The fourth Global E-waste Monitor reported that the economic value of the metals contained in the e-waste generated globally was estimated at US$91 billion in 2022.[9] In 2020, they had calculated that value at $57 billion.

In 2018, the International Labor Organization reported that six million jobs could be created globally by transitioning towards a circular economy which includes activities like recycling, repair, rent and remanufacture—replacing the traditional economic model of "extracting, making, using and disposing". As previously mentioned, the global average annual e-waste generated per capita is 16.8 lbs, but is 46 lbs per capita in the U.S. Last year my colleagues and I used this statistic in a pilot study to estimate the value of our Minnesota e-waste. We calculated that the average 267 million pounds of e-waste generated annually in our state could create 1,700 direct jobs.[10] According to the Coalition for American Electronics Recycling Jobs report, e-waste collection, de-manufacturing, shredding and information technology asset collection/refurbishing activities generate one full time job for each 172,000 pounds of e-waste processed. In Minnesota, the e-waste firm Repowered reported that for every additional 98,600 pounds of e-waste accepted in

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[6] https://ewastemonitor.info/the-global-e-waste-monitor-2024/

[7] KU Leuven. 2022. "Metals for Clean Energy: Pathways to solving Europe's raw materials challenge." Accessed at: bit.ly/MetalsCleanEnergy

[8] U.S. CPSC. 2018. "Status Report on High Density Batteries Project". Accessed at: https://www.cpsc.gov/s3fs-public/High_Energy_Density_Batteries_Status_Report_2_12_18.pdf

[9] https://unitar.org/about/news-stories/press/global-e-waste-monitor-2024-electronic-waste-rising-five-times-faster-documented-e-waste-recycling

[10] Jensen, M. et al. 2023. "The Economic Potential of E-Waste Recycling in Minnesota," Iron Range Partners for Sustainability. Accessed at: https://www.irpsmn.org/ewaste-recycling

their facility, they were able to add 1 full-time position to their recycling team. Repowered focuses on providing post-release opportunities and extensive training for those who have spent time in corrections.

Given the lack of comprehensive e-waste recycling rules in the U.S., states are starting to fill the vacuum. Of the 25 states with e-waste laws, 17 states have banned e-waste from landfills. In 2024, an ambitious 100% Electronic Waste Recycling Bill (SF 3940/HF 3566) was introduced in Minnesota with the goal of reducing pollution, inspiring economic activity, and recovering valuable metals.

Federal support for e-waste recycling takes the form of agency programs. In 2013, the Department of Energy created the Critical Materials Institute with a $120 million budget to research alternatives, reduce waste and diversify production. With funding from the Infrastructure Investment and Jobs Act, the DOE has initiated two new grant programs: the Battery Material Processing Grant Program ($3 billion for FY 2022–26) and the Battery Manufacturing and Recycling Grant Program ($3 billion for FY 2022–26). The DOE's $125 million Battery and Critical Mineral Recycling Program is designed to award grants for research, development and demonstration projects to create innovative and practical approaches to increase the reuse and recycling of batteries. The DOE has argued that these investments are essential to advancing a domestic supply chain of critical materials for the energy transition.

Consumer education and responsible collection are aspects of a circular economy strategy to reduce mineral demand. The EU estimates that such strategies can reduce 58% of critical minerals demand between 2022 and 2050 compared to a business as usual scenario, with recycled cobalt, nickel and manganese potentially supplying 80–90% of demand.[11] A similar report by an Australian think tank found that circular economy policies have the potential to reduce mining demand for cobalt, copper, lithium, and nickel by 25–55% of total demand by 2040.[12]

The Rocky Mountain Institute has argued that the evolution of battery designs may initiate dramatic shifts in energy systems as early as 2030. They report that new battery chemistries are expected to compete with the prevailing lithium-ion (Li-ion) technology. For example, RMI recently reported that solid state batteries are "poised to massively disrupt the storage industry by unlocking new opportunities for cheap, safe, and high-performing batteries".[13] Reduced battery sizes will also impact demand for nickel, cobalt, manganese and lithium.[14] Tesla reported that almost half of their EVs manufactured in the first quarter of 2022 had nickel and cobalt-free lithium iron phosphate batteries.[15] According to the IEA's Global Critical Minerals Outlook 2024, cobalt demand is expected to decrease by 30–45% in 2024.

Transit planning and technology design strategies can also reduce demand. Research by the UK group Transport & Environment found that combined policies that incentivize smaller EVs, innovate battery chemistries and reduce private car journeys could cut demand for key metals lithium, nickel, cobalt and manganese by 36–49% by 2050 in the European Union. This finding is also supported by the University of California Davis' Climate and Community Project. Their innovative modeling of material flows and socioeconomic policies showed that three key strategies can reduce U.S. lithium demand by 90% in the next 3 decades: decreasing car dependency, right-sizing EV batteries, and creating a robust recycling system.[16]

2) Reforming the General Mining Act of 1872

It will take time to establish the circular economy infrastructures that can meet critical minerals demands. The EU Metals for Clean Energy 2022 report suggests that gap could be as short as 2035 before sufficient metals from first generation products enter the recycling loop. If the U.S. adopted policies similar to the EU, including securing sustainable imports from reliable partners, we could imagine a

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[11] Environmental Justice Foundation. 2024. "Critical minerals and the green transition". Accessed at: https://ejfoundation.org/resources/downloads/EJF_critical-minerals-and-the-green-transition.pdf

[12] Dominish, E. et al. 2020. "The potential of avoidance, reuse and recycling solutions to minimise mining for lithium-ion batteries for electric vehicles". Institute for Sustainable Futures, University of Technology Sydney. Accessed at: https://www.earthworks.org/publications/recycle-dont-mine/

[13] https://rmi.org/insight/breakthrough-batteries/

[14] Transport & Environment. 2023. "Clean and lean: Battery metals demand from electrifying cars, vans and buses". Accessed at: https://www.transportenvironment.org

[15] https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/042122-almost-half-of-tesla-evs-produced-in-q1-had-no-nickel-cobalt-in-battery#:~:text=Electric%20vehicle%20maker%20Tesla%20equipped,quarter%20results%20presentation%20April%2020.

[16] https://www.climateandcommunity.org/more-mobility-less-mining

similar bridge period. During this time, it is paramount that terrestrial, or land-based, mining proceed with improved and enforced human rights and environmental due diligence to reduce harms. This requires Congress reform the General Mining Act of 1872.

In 2023, the Biden-Harris administration released a comprehensive report providing guidance to Congress and federal agencies for mining reform. The Bipartisan Infrastructure Law directed the Department of Interior and the USDA to identify legislative and regulatory recommendations to increase "the timeliness of permitting activities for the exploration and development of domestic critical minerals". This also followed a rulemaking petition from Tribes, Indigenous led organizations and conservation groups.[17] After eliciting 26,000 public comments and engaging in dozens of "listening sessions" with stakeholders, the Department of the Interior-led Interagency Working Group on Mining Laws, Regulations and Permitting (IWG) released 65 recommendations. Among these recommendations are the need for a programmatic environmental impact statement that identifies good sites for mining while allowing for "meaningful, robust, and early consultation between the federal and tribal governments". They also suggest a reclamation fee structure to help pay for abandoned mine cleanup. And, connected to my previous section, the recommendations encourage mining and reprocessing at previously disturbed sites.

3) Consent and consultation

Decarbonization and climate action shouldn't be pitted against Indigenous sovereignty. Globally, Indigenous communities bear the brunt of the mining industry's adverse effects, including on their health, environment, livelihood and culture, yet they share minimally in the benefits and have little input in decision-making.[18] A 2021 Morgan Stanley Capital International report found that 97 percent of nickel, 89 percent of copper, 79 percent of lithium, and 68 percent of cobalt reserves and resources in the U.S. are located within 35 miles of Native American reservations.[19] This has deep implications for the need for Tribal consultation and consent.[20]

The IWG report cited above concluded that fundamental reform of the Mining Law of 1872 is necessary to "achieve the best outcomes for communities and Tribes impacted by mining, America's clean energy and climate goals, and certainty for industry".[21] They also argue that agencies must be required to expand engagement with Tribes toward more meaningful, robust and early consultation. Congress should act in accordance with these recommendations.

Without such measures and protections, Tribes will continue to use legal means to block new mining. Indigenous sovereignty is being expressed through legal challenges across the U.S., including by evoking environmental quality standards that supersede federal standards. Almost exactly a year ago, the NewRange copper nickel mine in northeastern Minnesota had its Army Corps water permit revoked because it did not comply with the water quality standards set by a sovereign downstream tribe, the Fond du Lac Band of Lake Superior Chippewa. The Fond du Lac Band had EPA-approved water quality standards of their own in place, nearly twice as strict as Minnesota's, to protect their wetlands from mercury contamination. In August 2023, the Minnesota Supreme Court agreed with the Army Corps decision, and suspended the mining permit. Their ruling found that state regulators failed to fully consider the threats to water quality. This may be the first time that a Tribe objected to a federal permit on the basis of their rights under the Clean Water Act. The approach taken by the Fond Du Lac Band, not only to establish standards through local science but to defend their sovereignty at the agencies and in court, may be the tactic pursued by other tribes.

Tribes may also choose to challenge mining development through the granting of rights to nature. In the U.S., five Tribes have passed rights of nature resolutions, including the Menominee Indian Tribe of Wisconsin's adoption of a resolution to recognize the rights of the Menominee River. The White Earth Band of the Ojibwe nation in Minnesota adopted a *Rights of Manoomin* law in 2019 to protect wild rice

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[17] MRIWG Final Report. 2023. "Recommendations for Improving Mining on Public Lands". Accessed at: https://www.doi.gov/media/document/mriwg-report-final-508-pdf

[18] Deonandan et al. 2024 "Social License to Operate (SLO): Private governance and barriers to community engagement," The Extractive Industries and Society, 17: 101404.

[19] Block, S. 2021. "Mining Energy-Transition Metals: National Aims, Local Conflicts," Morgan Stanley Capital International. Accessed at: https://www.msci.com/www/blog-posts/mining-energy-transition-metals/02531033947

[20] See Owen et al. 2022.

[21] https://www.doi.gov/pressreleases/biden-harris-administration-report-outlines-reforms-needed-promote-responsible-mining

(*manoomin*).[22] The resolution specifies that no government entity can approve a permit that would allow for these rights to be threatened. Legal scholars Warner and Lillquist have written that while municipalities may face substantial obstacles to claiming rights for nature, in the form of vagueness, preemption and potential sanctions, Tribal claims may be more successful because they have both inherent sovereignty and different environmental ethics from most other communities within the U.S.[23]

While I am not Indigenous, my research has brought me close to those communities on the edge of new mining development. I've had the opportunity to listen to their concerns in their homes, and to harvest wild rice from their threatened lakes. It's become abundantly clear to me that without Indigenous leadership and Indigenous solutions to future minerals development, U.S. society will reinscribe a new era of unjust extraction.

In conclusion, a clean energy economy requires the federal government to invest in the circular economy of critical minerals because it is the most pragmatic, just and timely way to ensure responsible supply policies. This is achieved by reducing demands on critical minerals and supporting recycling and reuse. The Biden-Harris administration is investing in this work, and we need more time to see the results. In particular, Congress should follow the guidance of the IWG on reforms to the Mining Law of 1872. This can help usher in an era of responsible mining that not only avoids the worst harms to people and the environment, but builds a new model of industrial ecology where waste is seen as a resource for sustainable livelihoods.

I appreciate this opportunity to provide this statement and I look forward to engaging with the Committee.

Mr. STAUBER. Thank you very much for your testimony. I will now recognize Members for 5 minutes of questions, and I am going to recognize myself first for 5 minutes.

Dr. Williams, how does the way that USGS evaluates critical minerals differ from the way DOE evaluates critical minerals?

Dr. WILLIAMS. There are a number of different aspects, but the primary differences are, of course, that DOE's Critical Materials List is focused on the energy sector, and our work on critical minerals, as was mentioned, looks broadly across the full economic and national security spectrum, so that there are some things on our Critical Minerals List that are there for reasons other than energy priorities and don't overlap with the DOE list.

Also, because they are critical materials, some of them, as has been mentioned, things like electrical steel, are not composed of critical minerals themselves, but it is a manufactured product that there is a concern about supply. And our focus is on the fundamental mineral commodities.

Mr. STAUBER. And, Dr. Williams, how could placing DOE's materials on the USGS list, as H.R. 8446 proposes to do, streamline interagency coordination?

Dr. WILLIAMS. I think we would say that, basically, we work very well together right now already. And I did forget to mention that, of course, DOE does have that forward-looking component to critical materials. But we are absolutely open to anything that would help the complementarity of those approaches and lead to any increase in coherence of government policy.

Mr. STAUBER. And I think H.R. 8446 would do just that.

Mr. Cabrera, DOE's Critical Minerals List includes several minerals absent from USGS's list. How do you believe merging the

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[22] See the White Earth press release dated Feb 6, 2019. Available at https://celdf.org/2019/02/press-release-white-earth-band-enacts-first-of-its-kind-rights-of-nature/

[23] Warner, E.K. and J. Lillquist. 2023, "Laboratories of the Future: Tribes and Rights of Nature", California Law Review Vol.111:325. Accessed at https://doi.org/10.15779/Z38599Z292

two lists would benefit efforts to secure the U.S. minerals supply chain and meet future demand?

Mr. CABRERA. I believe that the DOE list, because it is forward-looking, accounts for the extreme increases in demand of several materials and minerals that is unaccounted for in the USGS minerals list. USGS has a very robust process that looks at actual production data, but because they are looking at actual production data, that data is dated. So, merging the two lists puts us in a better situation as a country to meet all of that forecasted demand. There simply won't be enough copper available to us for the energy transition, and that analysis has been done with respect to recycling. We simply have to mine more.

Mr. STAUBER. Thank you.

Ms. Macaluso, USGS does not currently consult with the Department of Health and Human Services when determining the Critical Minerals List. As the Chief Procurement Officer for GE HealthCare, which minerals are most susceptible to supply shocks, and what would their absence mean for patient care?

Ms. MACALUSO. Thank you for the question, Representative.

At GE HealthCare, we use over 50 critical minerals, elements, materials, and substances, and they are all vital to health care and to patients. Many of those critical minerals are single-sourced, and some of them are multi-sourced. So, it is very important that we rely on having input from the HHS Committee into making decisions around these, because we want to make sure that we are factoring in critical health care and patient impact.

So, when we are making laws, regulations, and to be able to monitor when there is scarcity of some of these, because they are critical and they do impact our patients and the healthcare system.

Mr. STAUBER. Well, there is some good news. The Pulsar, when you talk about helium, Pulsar Helium, the big find in northern Minnesota, 13.6 percent helium as part of that extraction, which we know that 3 percent is economically viable. So, it is a good find right in the heart of the Duluth complex, the working industrial Superior National Forest.

Mr. Rosenbusch, why are potash and phosphate so essential for the fertilizer industry?

Mr. ROSENBUSCH. Well, they are one of the three macronutrients that plants are required to grow, so we must ensure that all of our crops have adequate phosphate and potash. Otherwise, we wouldn't be able to achieve the crop yields.

I mentioned that 50 percent of crop yields in the world are because of fertilizer use. So, as we think about our role in feeding the world, but also our own national security, it is critical that these fertilizers are available to farmers, and that we produce as much as we can domestically so that they have multiple choices for those particular products. Not one is more important than the other, and all three are required.

Mr. STAUBER. Thank you. Before I yield back, I want to take a minute to thank Dr. Phadke for joining us today. It is always great to see a fellow Minnesotan.

And as someone who, based on your testimony, has an extensive background in environmental policy, I am sure you recognize we

are where the best water in Minnesota is found, right in the heart of mining country.

And I will yield to Mr. Huffman from California for 5 minutes.

Mr. HUFFMAN. And we want to keep it that way. Right, Mr. Chairman?

Mr. STAUBER. We will.

Mr. HUFFMAN. Thank you.

Mr. Rosenbusch, just quickly, to your point about the importance of these chemicals in industrial agriculture, you do acknowledge that organic farmers manage to provide these inputs without chemical additions, right, through strategies like mulching and compost and other natural alternatives?

Mr. ROSENBUSCH. Yes, we support all types of farming.

Mr. HUFFMAN. I just wanted to point that out. Thank you.

Mr. ROSENBUSCH. Organic farming is terrific, but can't feed the world.

Mr. HUFFMAN. I am going to reclaim my time and just ask that we enter into the record a 30-year side-by-side study by the Rodale Institute that has found that, after a few years of transition, the yields of these different models of agriculture are actually quite similar. There are other ways to provide the food that we all agree we need and we want, maybe without playing around with the list in question.

And I want to come back to that because many of us want to transition to clean energy, and we want to see more renewable energy, but we want to do it in a responsible, efficient, and environmentally sound way and a rational way as we contemplate supply chain security. There are real consequences to ill-conceived mining when it comes to public health, fish and wildlife habitat, outdoor recreation opportunities, businesses, and more. And I just think we need to have a very clear understanding of what H.R. 8446 would mean in the context of an industry that is already incredibly favored under existing law.

So, as a reminder, by amending the "critical mineral" definition in the Energy Act of 2020, we would be creating a loophole to make copper eligible for Federal support. And Dr. Williams, I just want to ask you to walk us through, if you would, please, why copper is not currently on USGS's Critical Minerals List.

Dr. WILLIAMS. Thank you for the question. Very basically, we depend on less than half of our copper to be imported. We have a relatively robust domestic copper industry. We have a fairly significant amount of copper that is also recycled. And for the approximately 40, 45 percent of our copper that we do import, we import it from reliable trading partners like Chile and Canada. So, from those major perspectives, based on the data we were looking at for the 2022 list, we did not see copper as a critical mineral.

Mr. HUFFMAN. What is your understanding, if you would, around the controversy over the proposal to add copper to the list?

Dr. WILLIAMS. Basically, it has to do with how we look forward, and what we expect in the future. If through the energy transition we have a significant increase in demand for copper or we just have a continuing demand for copper, how will those major components such as recycling, such as domestic mining, such as

importation from reliable trading partners respond to that increase in demand? Or will there be challenges that develop?

Mr. HUFFMAN. And I think it is also important to understand the United States' role in the global copper supply. Where does the United States fit into the global supply of copper?

Dr. WILLIAMS. We produce, I believe, a little bit less than 5 percent of the global copper mining, but use, as I mentioned, closer to 10 percent of the global copper budget. So, we are a significant player, but there are many other countries, such as Chile and others, who are much more significant in the production of copper.

Mr. HUFFMAN. And recycling?

Dr. WILLIAMS. It varies around the world. The European Union says that they are recycling about 60 percent of their copper. I haven't looked at those numbers in detail, but that would be significantly more than the amount we recycle.

Mr. HUFFMAN. Thank you.

Dr. Phadke, given that it can take a decade from exploration to commercial mining, how do we know the mines that are targeting the Critical Minerals List will actually be needed 10 years from now?

Dr. PHADKE. Thank you for the question. Everyone is trying to forecast demand, and to get it right. The new IEA 2024 study actually looks at 10 different scenarios for forecasting that demand, and a lot of those scenarios are based on different and new evolving kinds of battery chemistries. We know in that study they also suggest that cobalt could be out of batteries by 2030, based on the innovation in battery chemistry.

So, there are so many opportunities ahead of us. One study that came out of Belgium from the very distinguished KU Leuven Institute suggested that Europe, by 2035, will be able to meet between 50 and 75 percent of its critical minerals demands from recycling.

So, the demand forecasting is an art, and it really needs to incorporate a number of scenario plans.

Mr. HUFFMAN. Thank you. I yield back.

Mr. FULCHER [presiding]. Thank you for that. The Chair recognizes Mr. Gosar for 5 minutes.

Dr. GOSAR. Thank you, Mr. Chair.

Dr. Phadke, I am a big recycler myself. I have these big buckets of batteries. I don't want anything to go to the landfill. So, what condition do you feel our recycling is, poignantly? Is it 20 percent of our waste? 10 percent?

Dr. PHADKE. Recycling our e-waste is about 20 percent in the United States.

Dr. GOSAR. Would you agree with that, Dr. Williams?

Dr. WILLIAMS. I would actually defer to our expertise as primarily the mineral deposits and the e-waste broadly.

Dr. GOSAR. Yes, I am just trying to figure this out because we have had a number of experts before that have said it is anywhere from 5 to 20 percent. So, that is what I was trying to get at.

Dr. Phadke, can you force technology?

Dr. PHADKE. You can incentivize technology, and you can——

Dr. GOSAR. You can't force it.

Dr. PHADKE. Well, I think policies do present opportunities that move us in directions we want to support.

Dr. GOSAR. It might get you in the general vicinity, but when Einstein developed $E=MC^2$, he came up with the idea, right? And it is that one idea that stimulates all the rest of them. So, what I am saying is that, when we are talking about battery life, these are all estimates because it would take a quantum leap in technology to get batteries up to par with the combustion engine. Just that alone.

Mr. Cabrera, are you aware of the new smelting techniques?

Mr. CABRERA. Yes.

Dr. GOSAR. You are extracting smaller amounts of minerals, and you are getting everything out of them almost. Is that true?

Mr. CABRERA. The new smelter technologies are much more efficient, yes.

Dr. GOSAR. So, you are extracting in a certain type of ore. You can get everything out of there. Like, if it is platinum, gold, copper, all sorts of things off of that, right?

Mr. CABRERA. The new smelter technology is better at removing multiple minerals from the ore, yes.

Dr. GOSAR. OK. Is there a reason why you wouldn't want DOE, HHS, and USGS to be siloed in talking about all these minerals?

Because it seems to me like, if these minerals could interact, there are a lot of different things that somebody might look at in one eyesight that could help another. So, I see a danger. Do you see a danger in that siloization of these materials?

Mr. CABRERA. I believe that every complex problem deserves different perspectives. But I also believe that the question of critical minerals and materials is so urgent, it is so important, that we should invest in all of those different perspectives simultaneously.

Dr. GOSAR. You are aware of the Resolution Copper mine?

Mr. CABRERA. Yes, sir.

Dr. GOSAR. They have invested over $2 billion now for reclamation in that area which, mined over 100 years, and they still now, somebody said 10 years. That is a gift. We are talking about 20 years now, going on 30 years for that Resolution Copper.

So, shouldn't we be incentivizing the Good Neighbor policy with mining? They cleaned up. They spent $2 billion. They have come to me and said, "What do you want?"

I am saying, "Explain to people. Here is the water you put in. This is how dirty it is. Here is what comes out, and it is clean enough for you to drink. I want all those things to show the mining of today is not the mining of yesterday." Can you address that a little bit?

Mr. CABRERA. Yes. Comparing the mining of the past to the modern, highly-regulated mining that we do so well and so responsibly in this country is like comparing pizza to salad because they are both food. They are both food, but they are not the same. So, mining of the past was very different than mining of today.

And our demand for minerals is not decreasing, it is increasing. Yet, we are increasingly offshoring the supply. And as we do that, we are hurting the environment because there are very few countries on the planet that can take care of the environment the way we do. We not only have regulations, but we enforce them.

Dr. GOSAR. Ms. Macaluso, is that right?

Ms. MACALUSO. Yes.

Dr. GOSAR. Do you see what I was talking about, the siloization of these different materials? Would you find that kind of a complicated problem, especially in the healthcare field, with these rare, critical, rare earths and critical minerals?

Ms. MACALUSO. I am sorry. I am having difficulty hearing you. Could you repeat the question? Thank you.

Dr. GOSAR. Do you see any problems with the siloization of these, like, DOE, USGS, HHS in regards to the utilization of different minerals?

Ms. MACALUSO. From a GE HealthCare perspective, it is really important to us that we have HHS opinion with regards to these critical minerals because, at the end of the day, our patients and healthcare system relies on them. So, we would want to make sure that we have that healthcare input in determining the Critical Minerals List.

Dr. GOSAR. I thank the gentleman and I yield back.

Mr. FULCHER. The gentleman yields. The Chair recognizes Ms. Kamlager-Dove for 5 minutes.

Ms. KAMLAGER-DOVE. Thank you, Mr. Chair.

When we hear about the need to add this mineral or that mineral to the Critical Minerals List, it is usually framed as a way to boost new domestic mining of that mineral. I think my constituents know all too well what it is like to live alongside an extractive industry. The experiences they have had with pollution and public health problems from the Inglewood Oil field have made me very skeptical of an industry rushing to extract while promising to be responsible.

So, these new mines are being pushed as part of a clean transition. The need for this transition should be obvious, despite some of my colleagues' attempts to deny the ways climate change is already harming communities across the country. However, I am concerned that the urgency of the climate crisis is being co-opted by extractive industries to repeat harmful forms of development.

Dr. Phadke, much of your research focuses on what you have called the green energy bargain. Can you briefly explain what that bargain is?

Dr. PHADKE. Yes, thank you for the question.

When I talk about the green energy bargain, in particular I am referencing this scenario that has been presented to us by the mining industry that, if we want clean energy, new mining is a necessity. It has given the industry what you might call a green halo, and that has argued for fast-tracking new mines.

I want to challenge that, and I also want to challenge even the term "responsible mining," which is used widely across the industry. That term has now such interpretive flexibility that we aren't sure what it means. We are not sure who we are being responsible to, for how long, and with what assurances. Are we using the IRMA standards? Are we referencing responsible mining with the approach by, for example, the ICMM, which is the industry trade group?

Ms. KAMLAGER-DOVE. Thank you. It is co-optive language is what you are talking about. And I appreciate you also explaining that.

Many of my colleagues frame opposition to new mines as NIMBYism, but as you have mentioned, and as we have heard from so many witnesses, communities near mines have very real substantive concerns for their environment and health. So, given that the majority of known reserves of critical minerals in the United States are on or are near tribal lands, and many of those tribes have opposed these mines, why is improving tribal consultation and engagement so essential for being responsible in this space?

Dr. PHADKE. It is essential. Tribes have sovereignty over their lands. They have a long history of adverse impacts from mining. They are absolutely justified in their skepticism, given these past harms, and they are warranted in asking for the highest of standards.

They also have unique legal standing. And I will give you an example from the state of Minnesota, where the New Range Copper Nickel mining permit, just almost exactly a year ago, was revoked by the Army Corps, and that was held up by the Minnesota Supreme Court. The reason it was revoked is because that tribe has EPA-approved water quality standards that supersede Minnesota's state standards, and they have legal standing to do so.

And tribal challenges will continue, and this will delay our clean energy goals, and these setbacks that might come from these legal challenges have been successful in many cases.

Ms. KAMLAGER-DOVE. Thank you. How can recycling and alternative sources of minerals help us meet our critical mineral needs?

Dr. PHADKE. I have described in my written testimony and also here in my oral testimony that there are approaches that Congress can support that will help us advance the circular economy of metals, and there are tremendous amounts of minerals already above ground that we can further exploit.

The one point I want to make, though, is that there is violence in our inaction, and this is regarding the electronic waste that is building in our landfills that is leaching into our air and into our waters. We are creating new fenceline communities all the time because we are not addressing the piling up of this toxic waste.

Ms. KAMLAGER-DOVE. Thank you so much, and I yield back.

Mr. FULCHER. Thank you, and I recognize myself for 5 minutes.

We have three bills in front us today. And I want to thank the panel specifically for your participation. This does help. We do learn from this process. I do want to focus on H.R. 8450 for my line of dialogue, because there is a significant Idaho nexus there, as there are phosphate resources in my state.

And Mr. Rosenbusch, in your oral presentation it was interesting for me to hear that the overwhelming majority of phosphate fertilizer production in the world comes from China and Morocco. My understanding is also Russia and Saudi Arabia. Somewhere in the neighborhood of 80 percent of the processed phosphate comes from those regions. Yet, when looked at by the U.S. Geological Survey, there tends to be a focus on phosphate rock, which is in a different form, right? It is not processed yet. And that, in particular, comes from Peru.

Yet, if I understand you correctly, there is more than one way to look at that. Expand for a moment what happens to your viewpoint of the situation if you are only looking at the rock, as opposed to the entire process.

Mr. ROSENBUSCH. Yes, that is a fantastic question, and I think we are asking that it be evaluated the same way that potash would, for example. So, you are not importing potash ore. Potash is also processed and brought in as granular fertilizer. And similarly, phosphate, when it is processed from the rock into the granular phosphate fertilizers, look at Peru, for example, it is less than 6 percent of total demand in the United States because many of the countries that have those large reserves are doing their own manufacturing and then importing it in.

So, you have to look at that holistically to understand what the true demand and supply is for phosphate fertilizers in the United States. And we believe that that phosphate granular product would be consistent with the same way we look at potash.

Mr. FULCHER. So, in that vein, if you take a look at it from that perspective, should phosphate be on the Critical Mineral List, or certainly considered for that?

Mr. ROSENBUSCH. Yes, absolutely. And I think, when you look at supply chain shocks, it is the one that is probably more exposed than just about any of our nutrients. When we think about where that product is coming from, when we think about China's control over phosphates, it really does create a global dynamic of supply-demand that could put the U.S. farmer at risk. And we believe that, when you look at the true picture of phosphate trade and where product is coming in from, it would be a high priority for that list. It is a critical element.

We know that there are organic farms out there, but they are a third less efficient in terms of yields than what using traditional NPK fertilizers are. And there is no way we can sustainably feed the planet on organic farming alone. We need phosphate and potash.

Mr. FULCHER. Well, just like other critical minerals, we have that right here domestically, including in my state.

I only have a little less than 2 minutes left, so I want to deviate to something else that you talked about in your oral testimony, and that was permitting and lawsuits. You only have a little over a minute, but frame that a little bit better. When you say permitting is a hurdle, what is that specifically and what kind of lawsuits and from whom are you seeing that?

Mr. ROSENBUSCH. Yes, I think what the industry is looking for is efficiency. We want to be efficient in our permitting. And I think one of the things that critical minerals would do would give you a single agency to work with to get through that permitting process.

Every state is slightly different. The jurisdiction is slightly different. And I referenced one of the phosphate mines in Idaho that took 10 years to permit. And the amount of capital, the capital intensity of this industry, is incredible, billions of dollars that go into setting up some of these operations. So, the opportunity to get those permits so that we can mine more efficiently in a shorter amount of time, and also without adding significantly to the cost

of establishing those assets, is really the objective of Critical Mineral——

Mr. FULCHER. Are you seeing lawsuits, as well?

Mr. ROSENBUSCH. There are a ton of lawsuits. I mean, there are a lot of groups that will do whatever they can to block permitting. We have seen that with land trades, we have seen that with very specific issues. And oftentimes, they are not even driven by the community. It is driven by outside groups that are coming in that just have resources to prolong that process.

Mr. FULCHER. Mr. Rosenbusch, I thank you for that. I am out of time. I am going to yield my time to Mr. Curtis for 5 minutes.

Mr. CURTIS. Thank you, Mr. Chair.

In Utah, we take immense pride in the critical minerals sourced from our state and the Western region, the broader region. These minerals not only bolster our national security, but also drive medical advancements, a fact well recognized in Utah.

The process for identifying critical minerals mandates the USGS to collaborate with various government organizations. However, glaringly, the Department of Health and Human Services, HHS, was omitted from this consultation, despite the indispensable role critical minerals play in health care. And I get it. While it is imperative that the Critical Minerals List be established through an independent agency, it is equally critical for health care to have representation in these deliberations.

Helium is a good example of why this legislation is vital. Despite its scarcity, helium was removed from the Critical Minerals List, overlooking its indispensable use in MRI technology. Under the proposed legislation, consulting HHS prior to removing helium from the Critical Minerals List would become mandatory.

Moreover, medical isotopes, a technology rapidly advancing thanks to several Utah companies, underscores the urgency of this bill.

Why should we source minerals from Utah, when Russia, a major global helium producer, holds dominance? The opportunity to extract and develop these isotopes domestically is paramount, given their critical role in a myriad of medical applications from cancer treatments to diagnosing heart defects. Moving forward, it is imperative to pave the way for these medical advancements to flourish within the United States, rather than relying on external sources from our enemies like Russia.

Ms. Macaluso, could you please elaborate on the significance of critical minerals in GE's healthcare research and development?

Ms. MACALUSO. Yes, thank you so much, Congressman Curtis.

First, let me thank you for your work on healthcare policy. Prioritizing health care is important to Utah and to the country. So, we thank you for your dedication to patients.

With respect to research and development in medical technology, it is hugely important because it benefits patients and healthcare providers, all of us around the world. And while performing R&D for products, we explore the use of minerals, elements, materials, and substances so we can optimize product quality, performance, sustainability, security of supply, cost, and patient experience.

A practical example is the next generation of IPM magnets we recently deployed across our MR portfolio that uses 70 percent less helium. So, R&D on these critical minerals is hugely important.

Mr. CURTIS. Excellent. What implications would arise if GE and the other leading healthcare companies were able and given the opportunity to participate in these discussions before these decisions are made?

Ms. MACALUSO. Great. Thank you again for the question.

If manufacturers were not able to source these critical minerals, elements, substances, and materials, there could be serious impacts to patient care. And I will use helium as an example, because it came up so many times today. MRs use helium to lower the temperature in the systems because it allows the wires and the magnets then to have super conductive properties, and then that enables a magnetic field which allows you to generate the image.

If we think about GE HealthCare alone, there are 70 million MRI exams performed annually which assist doctors in early detection, accurate diagnosis, creation of treatment plans, and then monitoring those treatment plans. So, just consider what would happen if we didn't have access to having the helium. It would impact health care and impact patients around the world.

So, when you think about how these MRs are used for monitoring for stroke and brain conditions, cancer screening, spinal cord injuries, heart conditions among other usages, it is why we need the HHS input into making these decisions because we all rely on these lifesaving technologies.

Mr. CURTIS. Thank you. And with just a few seconds left. Medical isotopes.

Ms. MACALUSO. Yes.

Mr. CURTIS. A lot of people haven't heard of those. Why are they so transformative, and what is out there in the future for us with medical isotopes?

Ms. MACALUSO. Thank you for the question. They are very transformative.

Alzheimer's disease, Parkinson's disease, heart disease, prostate cancer, neuroendocrine cancer, and other advanced cancers are some of the conditions that these specific diagnostic radiopharmaceuticals diagnose as part of PET and SPECT scans. These imaging techniques can actually seek out the target of interest and allow us to then image it so that the appropriate therapeutics can be directed to it.

We strongly believe in the value of these tools for patients and providers.

Mr. CURTIS. Thank you so much. I am sorry I am out of time, but I think everybody can see why HHS should be included in these deliberations. Thank you.

Ms. MACALUSO. Thank you.

Mr. FULCHER. Thank you to the member from Utah. And to the witnesses, thank you for your testimony. Never underestimate the impact you have. And the fact that you are taking your time and effort to inform us means a lot. Oftentimes, that shapes what we do, so thank you for your participation.

Members of the Subcommittee may have some additional questions for the witnesses, and if so, we will ask you to respond in writing.

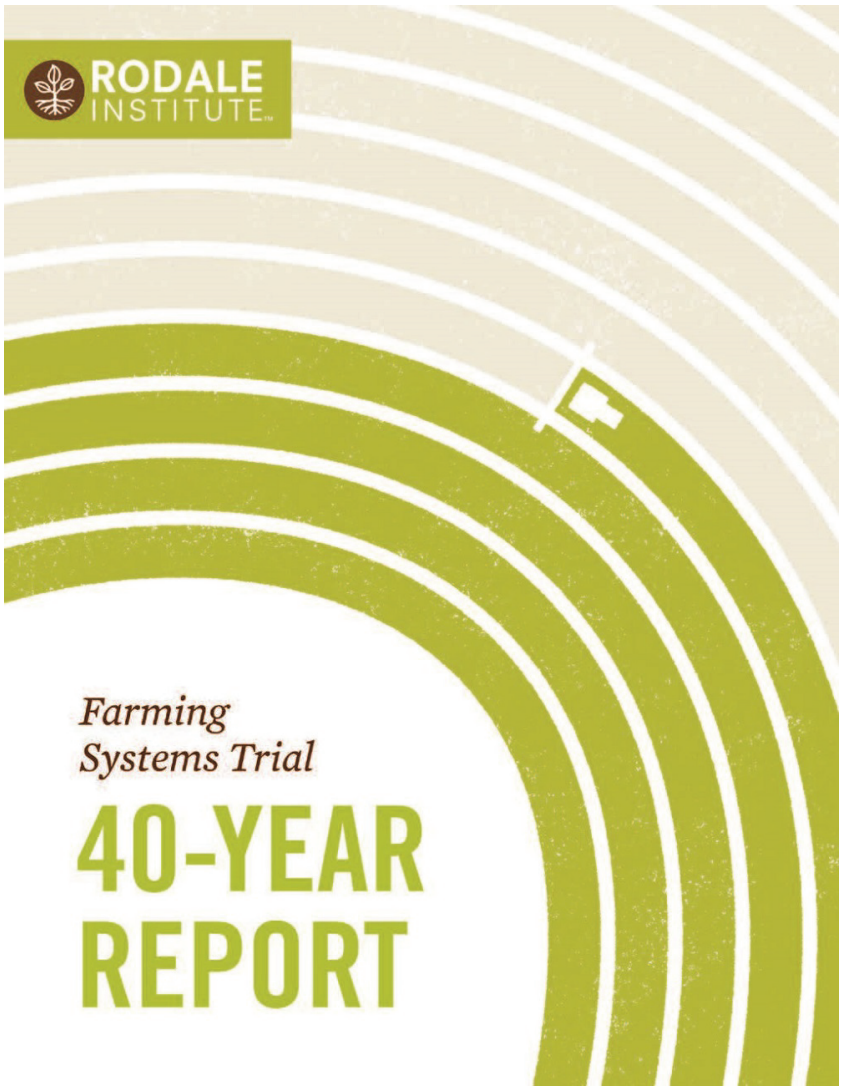
Under Committee Rule 3, members of the Committee must submit questions to the Subcommittee Clerk by 5 p.m. on Friday, June 7. The hearing record will be held open for 10 business days for these responses.

If there is no further business, without objection, the Committee stands adjourned.

[Whereupon, at 12:34 p.m., the Subcommittee was adjourned.]

[ADDITIONAL MATERIALS SUBMITTED FOR THE RECORD]

Submission for the Record by Rep. Huffman



The full document is available for viewing at:

https://docs.house.gov/meetings/II/II06/20240604/117364/HHRG-118-II06-20240604-SD004.pdf

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