September 25, 2025

SUBMITTED ELECTRONICALLY

Dr. Sarah Ryker
Acting Director
U.S. Geological Survey
Department of the Interior

RE: USGS 2025 Draft List of Critical Minerals [Docket No. USGS-2025-0039; GX25GB00PAMR000]

Dear Dr. Ryker:

The Solar Energy Manufacturers for America (SEMA) Coalition appreciates the U.S. Geological Survey (USGS) at the Department of Interior's (DOI) leadership in advancing a resilient and secure domestic energy supply chain and welcomes the opportunity to provide input on the 2025 USGS Draft List of Critical Minerals. As detailed in the following comments, the solar manufacturing industry faces persistent vulnerabilities stemming from concentrated global supply chains, particularly for critical and byproduct materials. These materials are foundational to solar energy technologies and warrant inclusion in the critical mineral list. **We commend USGS for considering the inclusion of silicon in the 2025 Draft List of Critical Minerals and urge the agency to consider maintaining tellurium on the list so the U.S. can build out every node of its domestic solar manufacturing supply chain**. We can only achieve lasting resilience by addressing vulnerabilities across the entire supply chain.

The SEMA Coalition is a diverse group of solar manufacturers united to rebuild the domestic solar supply chain. We represent the interests of the major non-Chinese solar manufacturers who are building or looking to build strategic solar components across the value chain in the U.S. Our coalition advocates for a suite of policies to build a secure and competitive U.S. solar supply chain to meet our current and future energy demand while creating good-paying manufacturing jobs and protecting our national security.

We respectfully submit the enclosed comments in response to Docket No. **USGS-2025-0039; GX25GB00PAMR000,** and welcome the opportunity to continue engaging with USGS on these important matters. For follow-up, please reach out to info@semacoalition.org.

Sincerely,

Mike Carr,
Executive Director
SEMA Coalition

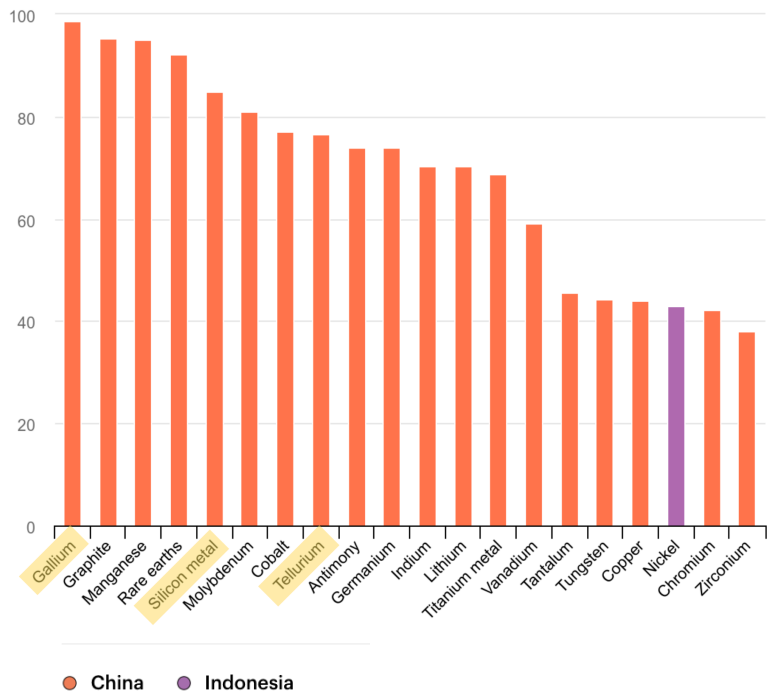
Background

The United States is undergoing a once-in-a-generation effort to reestablish domestic solar manufacturing and reduce dependence on foreign-dominated supply chains. This transformation is supported by strong policy signals to strengthen American energy dominance, including advanced manufacturing tax credits and executive actions intended to onshore production of critical energy components. There is growing demand for domestically manufactured solar as utility-scale solar is expected to make up 52% of new capacity in 2025. Looking forward, some analysts project the U.S. will add 58-181 GW of solar capacity annually between 2030 and 2035. However, materials essential to solar manufacturing remain exposed to geopolitical risk, concentrated refining capacity, and limited domestic supply. These risks threaten to undermine U.S. advanced manufacturing growth.

Key materials such as silicon, including polysilicon, tellurium, cadmium, and others, play indispensable roles in crystalline silicon and thin-film solar technologies. As shown in Figure 1, almost all energy-related critical materials, including those relevant to solar, are refined and processed almost exclusively outside the U.S., primarily in China, and are subject to price and supply volatility that U.S. firms cannot control.

In some cases, there is no viable large-scale substitute. Some of these critical materials are not only critical for solar technologies but also a key input for the semiconductor industry. Growing global demand for semiconductors increases market need for refined silicon feedstock, underscoring the need for strategic domestic supply chain growth. A forward-looking critical materials strategy must reflect not only energy system demand but also the bottlenecks in processing, refining, and recovery, and address unfair and distortive foreign trade practices that may adversely impact domestic manufacturing.

Figure 1: Share of Top Refining Country for 20 Energy-Related Minerals (IEA)



As USGS finalizes its 2025 List of Critical Minerals, the inclusion and accurate evaluation of solar-relevant materials is essential. The SEMA Coalition urges USGS to consider the full range of materials, direct and indirect, that enable solar technology production and to ensure the methodology accounts for the unique vulnerabilities in the solar supply chain. The future of American solar manufacturing depends not only on fair market conditions and a level playing field but also on the strength and security of the materials ecosystem that underpins it.

Geopolitical Context

In the U.S., a primary barrier to scaling up domestic manufacturing is the lack of domestic refining and purification infrastructure, as well as secure access to critical materials essential for next-generation solar technologies. These materials, including tellurium, are byproducts primarily of copper, bauxite, or zinc production and are processed almost exclusively outside the U.S. The U.S. must build out its midstream capacity to recover and refine these materials at the scale needed to support a growing solar supply chain to avoid forcing domestic manufacturers to rely on imports and exposing them to supply instability and geopolitical risk.

The U.S. retains polysilicon production capacity, but widespread Chinese market manipulation, state-backed subsidies, and the prevalence of forced labor used by foreign entities in solar-grade polysilicon supply chains continue to distort global markets. These practices make it difficult for domestic polysilicon producers to compete on price and contribute to bottlenecks throughout the U.S. solar and semiconductor manufacturing ecosystem.

China has built out a dominant position in global critical mineral processing through decades of strategic industrial policy and state-backed investments. As a result, China controls the majority of refining capacity for materials essential to energy technologies, including a majority share of tellurium and polysilicon refining. On top of China's share of the critical materials supply chain, they also leverage that dominance in the market to influence prices through various methods, including export restrictions, product dumping, state-controlled industry, and strategic acquisitions across the world. China's influence on these markets creates one of the steepest hurdles to U.S. production. Uneven and unfair global playing fields have led to uncompetitive markets for many U.S. producers.

In the U.S., policy uncertainty and the lack of strategic investment in certain critical technologies and materials further deters private investment in refining, processing, and midstream manufacturing of key energy components. This has complicated the ability of project developers and manufacturers to make major capital expenditures and plan for future investments. While the administration is taking steps to secure America's energy independence, domestic solar manufacturers currently face a constrained supply environment and are competing on an uneven global playing field at the same time that energy demand continues to grow. Consistency and certainty with respect to tax and trade policies will help provide a clearer path forward for domestic producers/manufacturers.

Recommendations

Silicon and Polysilicon

The SEMA Coalition is pleased to see the addition of silicon on the proposed 2025 List of Critical Minerals. Polysilicon is a foundational input for over 90% of global solar modules (c-Si), as well as semiconductors. Polysilicon is hyperpure silicon; for c-Si solar applications, polysilicon is purified to 9N (99.9999999%).

U.S. producers and their global capacities maintain polysilicon capacity through domestic manufacturers. That said, China's use of subsidies, massive overproduction, and price depression of solar-grade polysilicon have created significant market challenges. For example, Chinese polysilicon prices have collapsed to an artificially low $4.70/kg, far below the National Renewable Energy Laboratory (NREL) minimum sustainable price of $21/kg. Further, Chinese polysilicon producers rely on forced labor and operate with disregard for environmental considerations that results in a carbon footprint that is roughly double that of U.S. producers. Given China's pervasive and persistent polysilicon market distortions – coupled with its long-standing and unfair support of its solar industry – China's stranglehold on the polysilicon market will continue to create challenges for non-Chinese and allied producers.

The inclusion of silicon on USGS' 2025 List of Critical Minerals will serve as an important policy and market signal for the industry. The USGS should clearly express that polysilicon is part of the inclusion of silicon on the Critical Minerals list, as its main host commodity, given the critical importance of polysilicon to the solar and semiconductor industries and U.S. energy production, as well as the serious supply chain threat posed by China.

Tellurium

Tellurium is a key component for cadmium-telluride (CdTe) semiconductors used to manufacture CdTe PV modules. There is currently no commercial-scale substitute and there is limited solar-grade refining capacity in the U.S., with only two U.S. producers of tellurium in Utah and Texas.

The primary constraint on tellurium availability is not geology, but the lack of dedicated copper refining infrastructure. Tellurium is recovered almost exclusively as a byproduct during the electrolytic refining of copper, meaning its supply is tied to copper refining capacity—not solar demand. According to the 2025 U.S. Geological Survey Mineral Commodity Summary, China accounted for approximately 75% of estimated global refined tellurium output in 2024, and the country's production has increased significantly over the past decade.

Further highlighting the significance of tellurium, in February of 2025, the Chinese Communist Party (CCP) placed export controls on several tellurium-related products, further constraining

global supply chains. This action illustrates the CCP's recognition of tellurium as a vital mineral and warrants continued efforts by the U.S. to secure its own supply chains.

Despite increasing demand particularly from CdTe solar manufacturing, tellurium refining capacity remains geographically concentrated with copper refining infrastructure and therefore inflexible. Without investment in domestic recovery and purification infrastructure targeting tellurium bearing materials produced in the U.S. and allied nations, U.S. manufacturers could, in the future, become dependent on Chinese output and vulnerable to supply disruptions, price volatility, and foreign entities of concern related compliance risks. Expanding domestic and allied capacity for tellurium recovery from both traditional and complex streams is essential to support projected solar manufacturing and deployment growth and eliminate the risk of future supply chain exposure. Tellurium currently goes unrecovered from complex streams that contain other payable metals. Developing technology to economically refine these materials, thereby accessing both precious metals and critical minerals like tellurium, would have a positive impact on U.S. critical mineral security. However, this advancement will require time and collaboration between industry and academia.

Tellurium was appropriately designated as a critical material in the 2022 USGS assessment, and its importance has only increased. As a key input for CdTe thin-film solar technologies, one of the most commercially viable alternatives to crystalline silicon, tellurium is essential to meeting domestic solar deployment goals. Tellurium is also widely used in defense applications and thermoelectric devices for cooling and energy generation. The USGS should strongly reconsider its decision to remove tellurium from the 2025 List of Critical Minerals and consider elevating its priority level, given its strategic role in domestic manufacturing and limited global availability. In addition, the impact of CdTe PV and thereby tellurium to the U.S. economy, cannot be simply quantified by its effect on the CdTe PV industry alone, but instead should consider all the indirect and induced jobs supported by this industry.

Losing critical mineral status for tellurium would hurt CdTe PV manufacturers' abilities to secure corporate partnerships, slowing down manufacturing and deployment of vital energy infrastructure. In addition, it would significantly reduce collaboration interest from academics and their institutions and eliminate potential research funding streams, further hampering the U.S.' ability to compete with China on technological development. The U.S. maintains a strategic edge on CdTe PV and next generation tandem PV technologies, which will enable the country to leapfrog China and achieve American energy dominance. Without continued investment in this space, China may gain the strategic edge.

Tellurium's place on the critical mineral list has been instrumental in incentivizing private investment in domestic production. For example, the Rio Tinto Kennecott tellurium plant was made possible as a result of tellurium's place on the USGS list. This plant has been vital to

supplying domestic CdTe PV manufacturers with the raw materials needed to accelerate American manufacturing of solar technology. Without continued inclusion on the USGS 2025 List of Critical Minerals, companies like Rio Tinto will not be encouraged to continue to make additional investments in this space. We strongly urge USGS to maintain tellurium's status as a critical mineral as a result of its vital importance to the domestic solar industry, as well as metallurgy and thermoelectric devices.