

Graphite: The Other Energy Carbon

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US Critical Minerals

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Abstract

Graphite is a non-metallic crystalline form of carbon that occurs naturally as a mineral and can also be formed artificially from petroleum coke. Natural flake graphite is utilized in hundreds of different industrial and technical applications, including energy storage, which is predicted to drive global graphite demand over the next few decades. Run-of-mine flake graphite concentrate can be further processed with purification, sizing, shaping, and coating to make the material battery-ready for most technologies ranging from traditional lead-acid and alkaline batteries to both lithium-ion and primary lithium batteries. Natural graphite is designated as a critical mineral by the US Government as there is currently zero domestic production. The global supply chain is almost entirely controlled by China, including over 99% of the battery-ready graphite market. Graphite has not been mined commercially in the United States since the last mines of the Alabama Graphite Belt ceased production shortly after the end of World War II. Recent testing has demonstrated that flake graphite from the Alabama Graphite Belt can be upgraded to battery quality. These deposits contain enormous untapped resources that may serve as a long-term and environmentally sustainable domestic supply for US battery manufacturers. Suppliers to the Department of Defense in particular are currently vulnerable to disruptions due to trade wars and other geopolitical factors. This paper will review the current global supply chain, discuss forecasted demand, provide an overview of where and how to find graphite, summarize how to transform graphite from a low value industrial mineral to a premium tech-ready advanced material, and discuss the potential challenges and opportunities for developing a domestic supply in the United States.