How Critical Minerals Are Reshaping America’s Industrial Future

written by Jack Lifton | May 17, 2026

As a long-time observer and participant in the research and development of the global rare earth products utilization sector since 1962, I believe that I have an informed, clear, broad perspective and, in many ways, a more seasoned viewpoint of that sector than most of the many, many writers who cover it today, and who I see as mostly uninformed with regard to both the technical aspects (chemistry and metallurgy) of the subject matter and the business operations necessary for the economic success and continuity of companies involved in the total supply chain necessary to bring a successful and price competitive military or consumer product to market.

Today I want to talk about the commercial production and delivery to the (two) markets, the military and the civilian, of products requiring rare-earth permanent magnets in their composition.

First, let’s parse “requiring.” Rare earth permanent magnets are on a weight and volume basis. The smallest permanent magnets with the highest “magnetic” strength.

Because of these properties, size and strength, of rare earth magnets, the permanent magnet electric motors with the highest power for their size are Rare Earth Permanent Magnet Electric Motors. This makes such motors the best suited for the propulsion of electric vehicles as well as for their use in miniaturized form for all of the power accessories on a motor vehicle either for aircraft or a land transportation, and in the

manufacturing of cell phones, personal computers, and other devices, that would not be possible without the miniaturization of components allowed by rare earth permanent magnets.

The current emphasis in reporting the key deficits in American manufacturing that are the basis of the critical minerals crisis throws out business operations' terms without really explaining them. In particular the precise term, supply chain, is misunderstood. Supply chain is a definition of the individual steps required, beginning with the specific natural resources required, and identifying each chemical, metallurgical, and manufacturing process necessary, not just required, to turn those resources into a product for the consumer or military markets.

The supply chain for each end-use product is unique and is subject to change as new or newly applied technologies are applied to individual steps in the supply chain to reduce cost or improve efficiency or both.

Financial analysts are frequently confused by reports of innovative or disruptive technologies being applied to the supply chain for a particular end-use product. Any change in technology before it can be applied commercially to whatever aspect of the supply chain in which it is being attempted must satisfy a single metric, does it reduce the cost of the final product that is the target of the supply chain? Most reports of innovative or disruptive technologies are descriptions of laboratory experiments not of their measured effect on the cost reduction allowed by such innovative or disruptive technologies when operated at scale in that part of the supply chain to which they apply.

In fact, the costs of determining whether or not these changes operate to reduce costs at scale are often the reason that

junior companies seek to raise capital in the market. But the changes are always promoted as so far advanced that capital is needed only to build a demonstration plant, when, in fact, the real need is to demonstrate the technology at scale. Until such a project is undertaken, there is no way to determine whether the technology change is cost-effective.

In my view the key issue in the modern in the Contemporary Critical Minerals Crisis is the fact that it is necessary to develop, maintain, and preserve not just the sources of the minerals, the mines or wells, but also the vast array of physical operations necessary for the chemical, metallurgical, and manufacturing required to convert the critical minerals into end-use products. The problem, of course, is two-fold. First, maintaining such production and manufacturing operations is very expensive. Very, very, expensive if they are not in use and generate no revenue. Second and perhaps even more important is the maintenance of the human capital required to operate such plants. This means that workers, engineers, and scientists must be employed and must be required to teach their skills to the next generation. Even when the need for such skills is dormant, the skills themselves must be maintained or readily attainable. This is supposed to be a function of our universities and trade schools. Sadly, this has been neglected in the United States. This deficit is in fact perhaps the key problem that has caused us to fall behind in the current attempts to “reshore” or “restart” the end-user product manufacturing industries, the domestic absence of which is now revealed as ***the*** major problem.

It is very important to realize that while America has been deconstructing its supply chain bases, China has been building them. The two nations are actually, as electronic engineers might say, out of phase. The move in the capitalist world over the last generation to rapidly transfer manufacturing to the lowest-cost venues crossed paths with China’s agenda to become a

rich and, as soon as possible, a high-tech products manufacturing and exporting nation. The American government, in particular, paid no attention to this technology-focused agenda whatsoever.

So now we have a China, de novo, completely prepared with the complex variety of supply chains necessary to support high-tech manufacturing, a completely organized sourcing complex for all the natural resources necessary to support high-tech manufacturing, and an education system targeting the creation and maintenance of STEM-educated personnel necessary to support a growing high-technology manufacturing and exporting nation.

America cannot hope to compete in the world market for the large variety of manufactured goods, the production of which is now led by China. **America can, however, regain self-sufficiency, I think, in all categories of manufactured goods. But to do this we will need to understand that it will, and in fact already is, affecting our standard of living.** America can manufacture rare earth permanent magnets and rare earth permanent magnet electric motors, but it will not be able to export them against the competitive advantage of the Chinese manufacturing juggernaut.

America can regain a meaningful degree of self-sufficiency in strategically important manufactured goods, including rare earth permanent magnets and the electric motors that depend upon them. But doing so will require a serious national understanding of cost, industrial capacity, workforce development, and long-term strategic discipline. It will also require Americans to recognize that rebuilding industrial capability comes with economic consequences that will inevitably affect standards of living, capital allocation, and national priorities. What America cannot realistically expect is to outcompete China in global export markets built upon decades of integrated industrial planning, subsidized scale, and deeply entrenched

supply chains.

That may ultimately be the central reality confronting policymakers, investors, and industrial strategists today. In many respects, the modern critical minerals discussion has become dominated by political rhetoric, promotional narratives, and speculative capital formation — often without a sufficient understanding of the industrial complexity required to build economically sustainable supply chains.

In my view, the current push to recreate a rare earth industry in the United States has too often been driven by political slogans rather than industrial realism. The result is an emerging wave of overcapacity, poorly coordinated capital deployment, and government-supported projects that risk rendering the sector economically unsustainable before it has even fully developed.