“Ooh, Styrene!” How Critical Minerals Promoters Turn Hype into Capital

written by Jack Lifton | November 9, 2026

I have come to believe that two of the most overused and least meaningful words in the English language, at least as used by promoters of natural resources investments, are “important” and “advanced.” Promoters routinely apply the first to chemical elements, minerals, deposits, and discoveries, while the second describes processes and technologies meant to turn those discoveries into commercially useful products. Neither word, standing alone, tells us anything about a mineral deposit’s economic value or a process’s technical and commercial viability. Yet these words appear endlessly in the promotional literature of the junior mining industry, where their purpose seems to be not to inform investors but to impress them. I have seen this practice become so widespread that I sometimes wonder whether junior mining companies’ investor relations departments have entirely replaced technical and economic explanation with advertising slogans.

My irritation with this practice has a very long history. I remember an incident from the late 1940s, when I was about ten years old, that has remained vividly in my memory for nearly eight decades. Some friends and I were gathered in another boy’s apartment, fascinated by the newest technological wonder of the age, television. We were watching the Howdy Doody show on a seven-inch screen embedded in an enormous wooden cabinet. To us, the fact that moving pictures and sound came into someone’s living room through the air was astonishing. During a commercial, an announcer described some product as being made

from styrene. None of us had the slightest idea what styrene was, but one of my companions immediately exclaimed, with an exaggerated expression of admiration, **“Ooh, styrene!”** I have never forgotten that moment. As my chemistry education progressed, I eventually learned what styrene was, how it was produced, and why it was industrially useful. I suspect that I was the only boy in that room who ever did, or who ever cared to know. To this day, whenever I hear the word styrene, I am mentally transported back to that apartment, that tiny television screen, and that boy’s expression of awe at a word that meant absolutely nothing to him.

This memory isn’t significant because my friend was foolish. He was responding exactly as the advertiser intended. The advertiser introduced a scientific-sounding word into a commercial message to convey technological sophistication without explaining anything about the product. Styrene wasn’t used to educate the audience. It was being used to impress them. The fact that none of us understood the word was irrelevant to the ad’s success. Indeed, our ignorance may have been essential to its effectiveness. A word that sounds scientific can impress someone who does not understand it more than someone who does.

I see the same technique being used today to promote critical minerals and the technologies proposed for their production. We are constantly informed that a particular chemical element is “important,” that a mineral discovery is “strategic,” that a process is “advanced,” and that a company’s technology is “proprietary” or “revolutionary.” But important to whom? Strategic for what industry? Advanced over which existing technology? Proprietary in what legally defensible sense? Revolutionary in comparison with what demonstrated commercial practice? These questions are almost never answered adequately in the promotional announcements. Instead, investors are invited to accept adjectives as substitutes for the facts that would let

them make informed judgments.

The word “important” has suffered a similar degradation in the world of fine art. Dealers, auction houses, curators, and collectors describe paintings, sculptures, and increasingly digital images as important, and their interests in the works may be overwhelmingly financial or social. A painting that sells for a hundred million dollars is said to be important, but the price establishes only what someone was willing to pay for it. It does not establish the importance of the work to civilization or even to the daily lives of the overwhelming majority of humanity, which has little or no interest in the fine art market. The contemporary art world has become remarkably successful at confusing financial value, exclusivity, and cultural importance. The natural resources investment community has adopted a comparable vocabulary, routinely confusing a commodity’s potential market price, the geological existence of a deposit, and the ability to produce a useful material.

Consider rare earths, which have become the fashionable subject of extraordinary promotional activity. We are told that rare earth elements are important to national security, advanced manufacturing, electric vehicles, wind turbines, robotics, and modern electronics. This is true for particular rare earth elements in particular applications. It is not equally true for every rare earth element, nor does an element’s importance to an industrial application establish the commercial value of every mineral deposit containing it. The existence of neodymium in a mineral deposit does not establish that the deposit can be mined economically, that the neodymium can be recovered efficiently, that it can be separated from the other rare earths, that it can be converted into metal or alloy, or that the resulting material can be qualified for use by a manufacturer of permanent magnets. Yet a promotional announcement may use the word “important” to leap across this entire industrial supply chain without

explaining any of the steps required to make the mineral discovery commercially useful.

The same problem is even more pronounced when the word “advanced” is applied to process engineering. I have spent much of my working life observing, evaluating, and participating in the development of technologies for producing metals and materials. I have learned that a process is not commercially superior merely because it is new, because it uses unfamiliar equipment, because its chemistry is described in impressive language, or because its developers have obtained patents. A process is superior only when it can be demonstrated to perform a required industrial function more efficiently, more reliably, more economically, or with some other measurable advantage over an existing method. If a company announces that it has developed an advanced process for separating rare earths, I want to know what feedstock was used, what impurities were present, what recoveries and purities were achieved, how much reagent was consumed, how much energy was required, what waste was generated, and whether the results were obtained in a laboratory, a pilot plant, a demonstration plant, or a commercial operation. I also want to know what process is being replaced and what the proposed replacement will cost to build and operate. Without those answers, the word “advanced” tells me nothing.

It is particularly important to distinguish a technological improvement from a commercially useful innovation. A laboratory process that achieves an excellent separation of two rare earth elements may be scientifically interesting and may even be patentable. But if it requires expensive reagents, produces unacceptable waste, operates too slowly, cannot tolerate the impurities present in commercial feedstocks, or cannot be scaled economically, it may have no industrial value whatsoever. Conversely, a modest modification of an established process that

improves throughput, reduces reagent consumption, increases recovery, or eliminates a costly processing stage may have enormous commercial significance. A process’s industrial value is not determined by its novelty. It is determined by its demonstrated ability to improve production economics and reliability while meeting customer specifications.

This brings me to what I consider the central failure of the contemporary junior mining promotional system. The natural resources industry is not in the business of discovering interesting rocks. It supplies the materials manufacturing industries need at prices those industries can afford. The commercial supply chain begins with the ultimate customer’s requirements and works backward through the necessary manufacturing, metallurgical, chemical, and mining operations. A mineral deposit has commercial value only to the extent that it can become part of such a supply chain. An advanced process has commercial value only to the extent that it can improve that supply chain’s performance. Yet much of the promotional literature begins with the deposit or the process and assumes that a market for the desired product somehow establishes the proposed project’s economic viability.

I have repeatedly argued that the American critical minerals industry confuses capacity with capability. The announcement that a plant will have the capacity to produce a thousand tons of some material annually tells us nothing about whether the plant can produce that material at the required purity, consistency, cost, and delivery schedule. Installed equipment is not qualified production. A successful laboratory experiment is not a commercial process. A memorandum of understanding is not a purchase order, and a purchase order is not proof that a supplier can deliver. Nevertheless, promotional announcements routinely blur these distinctions to attract investors who may have little understanding of chemistry, metallurgy, process

engineering, or industrial procurement.

This analogy is interesting, given the legal concept of expert testimony. In the American and British common-law traditions, an expert witness may offer specialized opinions because the witness possesses knowledge, skill, experience, training, or education beyond that of an ordinary person on the subject under consideration. The legal standards are more demanding than merely knowing a little more than the average juror, but the underlying principle is that specialized knowledge may assist people who do not possess it. I sometimes wonder whether the junior mining industry has adopted a much less demanding version of this principle, in which anyone who knows slightly more than the intended audience can present himself as an expert. The problem is compounded when the audience is being asked not merely to accept an opinion but to invest its money on the strength of that opinion.

The investor relations industry is particularly well suited to exploiting this knowledge imbalance. Its function is to attract attention, generate interest, and ultimately encourage investment. There is nothing inherently wrong with these activities. Businesses must raise capital, and investors must know about opportunities. But when promotion replaces explanation, the distinction between informing investors and manipulating their ignorance becomes dangerously thin. The promoter has little incentive to explain why a technically attractive process may fail economically, why a mineral resource may never become a reserve, why a product may not meet a customer’s specifications, or why an announced production schedule may be physically impossible. These are the very questions that a technically competent investor should be asking, and they are precisely the questions that can interfere with a successful promotion.

The financial structure of the junior mining industry makes the situation worse. Many junior companies have no production revenue and depend on repeated equity sales to finance their continued existence. Their immediate commercial product is therefore not a mineral, a metal, or a manufactured material. It is an investment proposition. Management must continually persuade investors that the company's assets will someday become commercially valuable. In this environment, announcing an important discovery or advanced technology can be more immediately useful to the company's financing than the slow, expensive, and often disappointing work of demonstrating commercial production. The market may reward the promise long before anyone has proven it can deliver.

I do not mean to suggest that every junior mining company is engaged in deliberate deception, or that every investor relations professional is ignorant of the industry being promoted. Both groups include competent and responsible people. Nor do I suggest that technological innovation is unimportant. On the contrary, improvements in mineral processing, separation chemistry, reduction metallurgy, and materials manufacturing are essential if the United States and its allies are to rebuild industrial supply chains that have been allowed to disappear. But genuine technological innovation deserves technical explanation and independent evaluation, not a vocabulary of meaningless superlatives. Investors should be able to distinguish a demonstrated improvement from a proposed improvement, a pilot-plant result from commercial production, and an economically justified project from a financially attractive story.

The solution is not to prohibit promotional language. Instead, insist that promotional claims be accompanied by enough technical and economic information to permit meaningful evaluation. If a mineral deposit is described as important, the

company should explain its importance in terms of recoverable products, expected production costs, market requirements, and the ability to deliver those products to actual customers. If a process is described as advanced, its developers should identify the conventional process it is being compared against and provide evidence supporting the claimed improvement. If a project is described as strategic, the company should explain which specific industrial supply chain it will serve and what qualified product it intends to supply. These are not unreasonable demands. They are the minimum information necessary to distinguish an industrial business proposition from an advertising campaign.

Investors and the financial analysts who advise them also have a responsibility. The natural resources sector cannot be evaluated intelligently by looking only at commodity price forecasts, discounted cash flow projections, and the size of reported mineral resources. The technical feasibility of converting a resource into a marketable product is not a minor detail to be left to someone else. It is the foundation upon which every financial projection must rest. A financial model constructed around an unproven process or an unqualified product may be mathematically sophisticated and economically meaningless. The precision of its calculations cannot compensate for the uncertainty of its assumptions.

A Practical Checklist for Investors: Ten Questions Before You Write the Check

I suggest that investors in junior mining and mineral processing companies ask ten questions before committing their capital. These questions do not require the investor to be a chemist,

metallurgist, mining engineer, or industrial economist. They only require the promoter to provide answers that can be independently verified. An inability or unwillingness to answer should itself be regarded as useful information.

1. **First, what exactly is the company proposing to sell?** Is it a mineral concentrate, a mixed chemical compound, a separated oxide, a metal, an alloy, or a finished industrial material? Each is a different product with different customers, specifications, and market values. A company that cannot clearly identify its intended commercial product is not yet presenting a complete business proposition.
2. **Second, who is the customer, and what does that customer require?** Has a potential buyer specified the purity, physical form, consistency, quantity, delivery schedule, and price of the proposed product? Has the product been qualified for use in the customer’s manufacturing process? An expression of interest, a memorandum of understanding, and a binding purchase agreement are not interchangeable evidence of demand.
3. **Third, what has actually been demonstrated?** Has the company established a mineral resource, completed metallurgical testing, operated a pilot plant, demonstrated continuous production, or delivered qualified commercial products? These are distinct stages of development. Investors should demand a precise description of what has been accomplished, not a forecast of what management hopes to accomplish.
4. **Fourth, what makes the proposed process advanced?** Which established commercial technology is being improved upon or replaced? What measurable advantages have been demonstrated in recovery, purity, throughput, reagent consumption, energy consumption, labor requirements, waste

generation, capital costs, or operating costs? A process cannot meaningfully be described as superior without a defined basis of comparison.

5. **Fifth, has the process been tested on representative commercial feedstock?** A process that works with carefully prepared laboratory samples may fail when confronted with the impurities, variability, and physical characteristics of actual mined material. Investors should determine whether the reported results reflect the material the company intends to process commercially, and whether the tests have been independently verified.
6. **Sixth, what will it cost to produce a saleable unit of product?** This question must include mining, beneficiation, chemical processing, separation, refining, waste management, environmental compliance, transportation, and all other necessary operations. It must also distinguish the cost of producing an intermediate material from the cost of producing the final product the customer requires. A process that produces a valuable material at a cost greater than its achievable selling price is not a commercial success.
7. **Seventh, what facilities and capabilities already exist, and what remains to be built?** Does the company own operating equipment, possess the necessary permits, employ qualified technical personnel, and have access to the required reagents, utilities, and infrastructure? Announced capacity is not demonstrated capability. Investors should distinguish installed equipment from commissioned equipment and commissioned equipment from reliable, qualified production.
8. **Eighth, how much additional capital will be required before commercial production begins?** Has the company presented a credible estimate of the total capital required to reach sustained production, including

commissioning, working capital, contingencies, and the cost of correcting technical failures? How much of that capital is actually available, how much remains to be raised, and what dilution or debt obligations might result? A company's share market value is not the amount of money available to build its project.

9. **Ninth, who has independently evaluated the technical and economic claims?** Are the company's conclusions supported by qualified engineers, metallurgists, geologists, and industrial economists with relevant commercial experience? Have their assumptions, limitations, and potential conflicts of interest been disclosed? A consultant's impressive résumé is not a substitute for demonstrated competence in the particular technology or industrial operation being evaluated.
10. **Tenth, who benefits financially if the promotion succeeds but the project fails?** Investors should examine management compensation, promotional expenditures, related-party transactions, stock options, warrants, insider share sales, and the terms under which early investors or vendors acquired their interests. The most revealing question may be whether management's principal financial reward depends upon establishing profitable production or merely upon maintaining a sufficiently attractive market valuation to permit another financing.

I would add an eleventh question, which I consider the most important of all: **If the company disappeared tomorrow, which existing or prospective industrial customer would be unable to obtain a required material, and why?** The answer may be that no customer would notice. That does not necessarily mean the project has no future, but it should put the promotional use of the word "important" into perspective. A material can be essential to an industry without every proposed supplier of that

material being essential, or even commercially viable.

These questions are not intended to discourage investment in natural resources. They are meant to direct capital toward companies with a reasonable prospect of becoming productive industrial enterprises. The critical minerals sector needs investment, but it needs productive investment, not merely the continuous financing of attractive narratives. A promoter who can answer these questions with verifiable facts deserves an investor’s attention. One who responds with another collection of adjectives deserves skepticism.

I have now spent more than six decades in and around the production, processing, and marketing of less common metals. During that time, I have seen genuine technological revolutions, important industrial achievements, and an enormous number of commercial failures. I have also seen the vocabulary of technical achievement increasingly appropriated by people whose principal interest is financing rather than operating industrial enterprises. This has not improved investors’ ability to distinguish productive businesses from speculative promotions. I believe it has made that distinction more difficult.

I return, therefore, to that room in the late 1940s, where a group of boys sat watching Howdy Doody on a seven-inch television screen. One of them heard a scientific word that he did not understand and responded with admiration. The advertiser had succeeded. Nearly eighty years later, I hear essentially the same response from investors when a junior mining company announces an important critical mineral discovery or an advanced processing technology. The words have changed, the sums of money have become vastly larger, and the consequences of misunderstanding are considerably more serious. But the method remains the same.

“Ooh, styrene!”

The natural resources investment community would be better served if, before reaching for its checkbook, it learned to ask a very simple question:

What does that mean, and can you prove it?