

# The Disruptive Discoveries Journal

**Weekly analysis of how disruption in commodities, geopolitics, and macroeconomics converge to create opportunities**

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## **Rare Metals on a Collision Course**

### **Book Review of “The Elements of Power: Guns, Gadgets, and the Struggle for a Sustainable Future in the Rare Metal Age” by David Abraham**

In the autumn of 2011, my father and I were approached to present to a group of faculty and undergraduate environmental studies majors at a major university here on the East Coast of the United States. The topic was rare earths. What struck me was the fact that nobody was taking notes using a pen and paper – each student was typing away on his or her Mac or PC. While the presentation went well, we were astonished by the lack of knowledge the students had regarding the global supply chain risks inherent in many of the metals and minerals used in the technology that we take for granted. Were the students aware that the cobalt in their computer was quite likely not ethically sourced? This generated several questions. Would they be willing to pay more for a product if they could be sure people weren't being exploited along the entire supply chain? What about the fact that many of these metals and minerals are critical for national defense and China (a strategic adversary) essentially controls the bulk of production of many of them? There were no easy answers to these questions then and there are none today. The general ignorance of the underlying supply chain dynamics and the strategic and tactical threats have likely increased despite a horribly depressed metals market.

Unfortunately, these students were likely a microcosm of the broader populace who are unaware of the destabilizing effects of foreign mineral dependence on supply chains for rare metals. For this reason, David Abraham's excellent new book titled "[The Elements of Power – Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age](#)" couldn't have come at a better time.

Mr. Abraham is the director of the Technology, Rare and Electronic Metals (TREM) Center. With a background on Wall Street as well as a stint in Washington DC at the White House Office of Management and Budget, his varied background gives him a unique perspective. He details the issues we face as we head into what he describes as the “Rare Metal Age” – a time when minor metals many have never heard of become increasingly important in sustaining or increasing our quality of life as well as maintaining our safety.

Mr. Abraham’s work struck a chord with me. It aligns perfectly with our current world view surrounding convergence of lifestyles on a global scale. His thesis states that as the world becomes more connected and technology becomes more ubiquitous, we’ll need more of these rare and critical metals. For the sake of clarity, Mr. Abraham provides a broader definition of rare metals rather than what many of you may be familiar with including niobium, lithium, or gallium. This book is a call to action. He highlights both the commercial and military risks of indefinite resource dependence well into the future. This may be exacerbated by the fact that as the world turns increasingly towards renewable energy which are enormously dependent on rare metals to function properly, the potential for supply chain disruptions may increase.

Mr. Abraham’s breezy verve allows him to tackle such a multi-faceted topic with relative ease. His firsthand accounts of visits to Niobium mines in Brazil or rare earth processing facilities in Estonia not only make you feel as if you were present, but help elucidate the scope of the challenge regarding resource dependence.

The book is organized to help the reader understand the challenges facing each part of the rare metal value chain from exploration and development, to mining, to refining, to trading, to manufacturing of end products like magnets. Because of this, different readers are likely to have certain chapters of the book hit home more than others. That was certainly the case with me when Mr. Abraham discusses the junior mining sector and the low probability of success. Because of this, Mr. Abraham quotes a market participant stating that most junior mining executives are just “mining the market”, meaning they line their own pockets at the expense of shareholders (remember Molycorp?). While this is a generalization, it is mostly true and Mr. Abraham ought to be commended for exposing this uneasy truth that many in the sector won’t acknowledge. Despite this lack of trust and utter value destruction, Mr. Abraham states:

***“The concern now – due to the paucity of investment since the financial crisis and the long lead time needed to develop rare metal projects – is that sooner or later, our visions of a high-tech future will collide with the reality that we didn’t invest enough in ensuring an adequate supply of critical materials.”***

Well put and very true, but with the capital markets shut down for mining investment and institutional and retail investors still nursing their wounds from the end of the commodity super cycle, any investment in the critical metals sector will have to come from somewhere else. Given that most metals prices have crashed and more pain is likely to come, it would be interesting to see how many of these junior mining projects are economic at current prices or how the entire market, from producer to explorer has adjusted to this new reality. Will the invisible hand of the market allow these small markets to self-correct? Perhaps this is fodder for a follow up book.

Thankfully, this book isn’t all problems and no solutions as Mr. Abraham devotes the end of the book to exploring how the public and private sector can and must work together to begin to establish a critical materials supply chain that is less dependent on foreign countries. Recycling is also given a

close examination, but as with anything else, economics matters most and the take away is that much of the opportunity to recycle critical materials from electronic waste is not worth the trouble.

Make no mistake – this is an excellent read. Perhaps the only thing stopping a full blown resource conflict is the twin headwinds we’ve written about so much recently in excess capacity (Mr. Abraham does an excellent job of elucidating this with REEs) and slack global demand. However, this structural disinflationary paradigm won’t last forever and this means that the current lull in rare metal demand won’t last forever either. Who is preparing now for this turn? Mr. Abraham’s tome should be a wake-up call to all of us – from policy makers, to investors, to end users to prepare for looming volatility in an increasingly integrated and volatile future. Anyone concerned about how we balance sustainability with a high-tech future should read this book.

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