

Watch out for those claiming critical minerals expertise

written by Jack Lifton | January 13, 2023

The unambiguous ignorance of politicians, journalists, and the self-selected academic “experts” who advise them on the topic of the available supply of minerals that are critical for the decarbonization of the energy economy is leading policy makers to very bad decisions.

It is clear to anyone who looks at the geological data and has a knowledge, or at least an informed (by experience!) overview, of modern chemistry and chemical engineering that mining engineering in 2023 is incapable, financially, of recovering for use any more than a fraction of what would be needed of the minerals critical to the total global decarbonization of the energy economy using currently known technologies and fossil fueled energy.

A reader at this point might look at the above paragraph and say that it’s based on a logical fallacy, an appeal to authority, rather than on data analysis, but, in fact, it’s that type of fallacy, an appeal to unqualified authority, that drives the entire climate change crisis, which is an appeal to the authority of the scientifically and culturally ignorant and illiterate.

The problem is the widely accepted metric known as “earth abundance.” This is defined as the proportion of a given chemical element in the earth’s crust, the forty kilometers or so of (mostly) solid rock that overlays the earth’s interior. The scientists who have measured a few points at significant depths have decided that the crust has a generally uniform distribution of chemical elements when taken as a whole, even if

there are occasional concentrations of some of them at or near the surface.

Those occasional concentrations present as minerals that have more than the average (earth abundant) content of a metal or metals. These concentrations are formed by geological chemical processes and the ones that occur at or near the boundary between the atmosphere and the crust (aka, the earth's surface) may also be affected by the processes known as "weather" and although these weathering processes may take millions of years to operate, they are still quicker than the billions of years it took for the molten earth to cool and differentiate its surface from its interior. These processes are not "organic," once they have occurred and the near surface minerals have been extracted (mined) and processed (refined into useful forms) the deposits are gone and will not reform or refill.

Additionally, for a deposit to be a useful mine, mechanical and chemical processes that are practical and economical must be available in order to refine the extracted minerals, and produce metal that is affordable.

And, such deposits must be accessible to necessary infrastructure, such as roads or rail, electric power, and fresh water.

The limitations of human ingenuity and simple cost issues limit the economic recovery of chemical elements from deposits to those with high grades (concentrations). All such deposits, no matter what the grade are limited in extent by geological and weathering processes that either occurred millions or billions of years ago or take thousands of centuries to have an effect. As mining exhausts the high grades of a deposit, the extraction and concentration to processable levels of lower grades becomes so costly that at some point the mine's life is over.

Of course, chemical engineering has been advancing, so that we hear daily of companies that will "mine" tailings (mining residues) to get additional desired metal values that were too low in grade to be recoverable in the past, usually due to economics.

Note that the concentration of minerals has been a chemical/mechanical process known as flotation for about 125 years. Lately it has become possible to use electromagnetism and optical processes to sort and thereby concentrate some previously ignored ores and residues to workable levels of concentration.

But the variety of chemical reagents necessary to extract the desired metal values from the concentrates is quite small due to chemical engineering costs. Academics are always proposing new "reagents" for various aspects of cracking and leaching ores or for separating mixtures of related elements but almost invariably these new reagents are simply too costly to be economically deployed.

In a previous article I have demonstrated why there simply is not enough lithium, as an example, accessible and available to us, to globally completely transform fossil fueled transportation and electrical grid buffer-storage to non fossil fueled operation.

China. Having seen this problem coming more than a decade ago has already deployed trillions of dollars of capital and millions of man-years into preparing itself to have a low-cost energy basis for a non-fossil fuel energy regime. China dominates the processing of lithium and the manufacturing of lithium based rechargeable storage batteries. It has acquired world wide control or ownership of more than 60% of the accessible, recoverable lithium; it processes 80% of the world's

cobalt; it processes 60% of the world's copper; and most of the gallium, indium, germanium, silicon, tellurium, and the rare earths.

Deglobalization is merely cementing China's dominance in the materials necessary for the production and use of alternate energy.

Central and South American governments along with many in Africa are nationalizing critical mineral natural resources, and even if the nations involved can't utilize the minerals directly they are requiring foreign buyers to add value in the country of origin, so as to create employment and wealth downstream of the physical extraction of the mineral.

The experts, who include Elon Musk as well as the CEO of Volkswagen have been separately quited lately as saying that there is no shortage of lithium. The miners are just moving too slowly.

These men and many others are simply wrong, and the tragedy is that those that are wrong are in charge and are deploying trillions of dollars in a lost cause that only indebts a generation and robs it of the cheap energy that is the basis of a modern society.

China alone today has sufficient resources of critical minerals, processing, and fabricating technologies to ensure and secure for itself the low cost energy that is the basis for prosperity.

The rest of the world will now fight for the critical mineral resources just to maintain a declining standard of living.

It's time to stop listening to the experts.