

The Central Processing of Critical Metals, an Idea Whose Time Has Come

written by Jack Lifton | April 1, 2022

If individual nations and politically aligned regions are to achieve self-sufficiency and security of supply, as soon as possible, for the critical metals necessary for their defense and consumer economies, then the most efficient use of time and money in pursuit of these objectives is of paramount importance and duplications of effort are to be avoided at all costs.

This means that the central processing of the beneficiated ores and scraps containing recoverable quantities of the desired critical metals is the best solution to avoid the paramount deficiency in the downstream processing of critical materials into customer-specified end-use forms; the lack of educated, experienced, and demonstrably skilled chemical and metallurgical engineers specialized in hydro-, pyro-, metallurgical, and manufacturing engineering, whose training and opportunities for experience in the West have been scaled down dramatically since the politicians in the West failed to adopt an industrial policy to maintain not only secure supplies of critical materials, but also of [critical skills](#).

Dr. Chris Haase, the former Director of the Critical Materials Institute of the U.S. Department of Energy recently spoke with me about this topic, and he said that “the resulting [political] weakness of the US natural resources industry has caused a significant decline in the number of newly trained mining, metallurgical, and extractive metallurgical engineers in the US.” He added that “Recent data show that the United States graduates fewer than 207 hydrometallurgical engineers annually.

Hydrometallurgy is a combination of multiple functional specialties that target the recovery of metals from their ores and scraps using fluid-based processes, by applying multiple processing steps involving physical, chemical, and sometimes electrical processes that include beneficiation, dissolution, and concentration that allows the separation, purification, and refining of finished metal and alloys. Achieving economically and environmentally sustainable operations requires a confluence of skills and expertise to deliver value at scale.”

“Unfortunately,” he added, “the closure and/or sales of major US mining corporations in the 1970s and 80s resulted in the closures of nearly all corporate mining and extractive research and development labs. The closure of the US Bureau of Mines in 1996 and the transfer of its accountabilities to the US Geological Survey and the US Environmental Protection Agency further bifurcated and balkanized US hydrometallurgical research, development, and advisory capabilities. The remaining US know-how and technical capabilities reside primarily in [just] a handful of select mining universities (e.g., Colorado School of Mines, New Mexico Institute of Mining & Technology, South Dakota School of Mines, University of Idaho School of Mines), US National labs (e.g., Oak Ridge National Labs, Idaho National Labs, Ames Lab), and largely retired, nationally recognized experts with industrial experience.

Because hydrometallurgical processing and technology are essential for the production of critical materials necessary to deliver a future clean energy transition and to support strategic (i.e., military and high technology) supply chains as well as the vastly larger consumer industries it is of vital national importance to preserve, advance, and champion the hydrometallurgical discipline, capabilities, know-how, and technology research and development necessary to support US competitiveness.” It is also extremely necessary to **conserve**

these critical skills.

The best way to restore American self-sufficiency and security of supply of critical natural resources is to consolidate and thereby maximize the efficient use of America's legacy skills in mineral resource exploration, processing, and the mass production of useful forms of the natural resources by minimizing government involvement where it, government, has the least skills. These areas include finance and non-health and safety regulations.

Left on its own, the American minerals industry maximizes the efficient use of capital, because capitalism is unforgiving of its inefficient use.

Left on their own the best managers in the natural resource industries have come to the conclusion the dwindling skill reserves of the American natural resource industry mandate the creation of central processing facilities where the large variety of ores, scraps, and residues for various non-fuel minerals of critical metals can be preprocessed to prepare feedstocks for further processing into useful forms by the most efficient technologies the cost and capacity of which is not prohibited by insufficient feedstocks. This is exactly what China is now doing in the rare earths' space!

An American industrial policy would encourage the financing of centralized toll processing, minimize non health regulation and permitting, and otherwise get out of the way. Successful clean energy policies must be result-oriented, and reality-based, not just policy statements. The research and development of clean energy nonfuel minerals integrated processing technologies must be encouraged both at universities and at the industrial level. This is how the U.S. Defense Department procurement has always operated. The technological spinoffs of their work underpin

today's global consumer as well as defense technologies.

Only an industrial policy, the success of which is judged by performance to objective, not the enrichment of governing cronies, can save the USA from second class status in a world where nations with such policies are already succeeding beyond the dreams of the senescent "progressive" capitalism being preached in the United States.

During World War II, capitalism with American characteristics gave the world the richest, most powerful, most opportunity-laden for all, nation in mankind's history.

It's time to revive that spirit.

Circling the theory of an EV revolution, Lifton takes on the 'dumbest assumption of the greens'

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The "law" of supply and demand is in reality an academic ideal "model" that only works in a prescribed universe in which both demand and supply have no limits. In the real world, the model fails when it is applied to the finite supply of natural resources of this planet.

Case in point: The [demand for lithium](#) expressed as the necessary amount of this natural resource to accomplish the transformation

of the motor transportation industry from the utilization of fossil fuels for motive power by internal combustion engines (ICE) to storage battery fueled electric motors (BEVs) is not possible, due to the limitations of lithium separation from the Earth's lithosphere (crust) by man-made operations that are economically palatable to our civilization. The so-called green new deal is ridiculously expensive; it would require that all of our focus be on destroying the society that cheap energy has bestowed upon the world and making the current broadly shared consumer driven economies impossible of continuation, and close off any additions to consumer economies from Africa, most of India, and South America. The dumbest assumption of the greens is that there is an infinite supply of money to be used to achieve an unlimited supply of resources that would be needed to meet their mandated demands to turn the global energy economy "green."

The only way that an EV "transformation" could take place with the resources that are accessible to us would be if the current internal combustion engine motive power of land and sea transport were replaced by a hybrid system of combined internal combustion and battery electric power. This would conserve both types of motive fuels, fossil based for internal combustion and stored electricity produced by fossil, nuclear, and alternate (wind, solar, and hydro) fuels, by utilizing them in the most efficient way. The idealization of personal transportation would also require the end of consumer choice and its replacement by durable, commodity, easily maintained and repaired, recyclable vehicles with long use-lives. This, in fact, was the "ideal" that Soviet Russian communism was supposed to attain. It didn't work although it was mandated by the State and put into proto-practice across the Soviet empire. It was maintained only by fiat and fear. As soon as the Soviet experiment failed Western consumer choice driven cars rapidly replaced the dull,

inefficient, poorly designed and made Yugos, Trabants, Lada's and Dacia's of the Soviet communist experiment.

The Chinese Communist Party has for the last twenty-five years embarked on a re-modeled approach to achieving communism, which has resulted in a system based on first using market capitalism to offer choices to rapidly improve the lifestyles and standard of living of China's people to be followed by a leveling of the inequality of income that inevitably follows when substantial private ownership of the means of production is allowed, by re-asserting the right of the state to control the markets for the products that capitalism has shown that the people want as a measure of a contented life.

The Chinese model of using [capitalism with Chinese characteristics](#) to bring about socialism with Chinese characteristics in order to bring about a society based on communism with Chinese characteristics is a work in progress.

Western thinkers believe that the intentionally chaotic system of modified free market capitalism used in the United States and Europe by their mostly republican, democratically elected, governments, is the "ideal model."

Chinese rulers, elected by only a minority of the population, the members of the Chinese Communist Party, believe that their state managed economics with Chinese characteristics is the right model for the development of a Chinese Communist State, and express their beliefs in planning mandated long term industrial policies.

The Chinese don't seem to want to bring Marxism with Chinese Characteristics to the world, by force, anyway, as the Soviets did. They are remodeling their own nation as a closed system using the outside world only to perfect and maintain that closed system.

It remains to be seen if the Western model of innovation through disruptive technologies will continue in the face of a green new deal that will exacerbate inequality and destroy the middle class which has allowed modern Americans to enjoy the highest standard of living in history.

I think that the chaotic disruption of the OEM automotive industry based on a false premise of an infinite resource supply to meet a mandated demand will fail and could bring about an accelerating decline in lifestyle, quality of life, and America's standard of living.

For what purpose? Oh yeah. To save the world.

As an infamous American officer said during a meaningless war, "We had to destroy the village to save it."

In the near term buy into the hard to produce battery and electric motor metals, primarily [lithium](#) and the [rare earths](#), and those companies that have found accessible deposits of any and all of them. Even if I'm wrong and there is an EV transformation it will take a very long time, and it will require for many years more lithium and rare earths annually than have ever been produced annually before.

Finally, be on the lookout for economically efficient new and newly applied process technology. It's the only thing that could get us through the coming grade deflation as the best deposits are high graded out.

China is winning the war for the future.

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The perennial key geopolitical and geoeconomics issues of the conflict among nation-states over the allocation of scarce critical natural resources have, in the last 25 years, been dramatically affected by the current wave of the globalization of the ownership and of the productive output of natural resources, primarily in Africa and South America. Contemporary globalization has worked very much in the favor of the Peoples' Republic of China (PRC). China's goal of self-sufficiency in all natural resources, technologies, and industrial manufacturing for the stated purpose of achieving total independence from the rest of the world is well on its way to success.

China has combined a coherent industrial policy, based on the above stated goal, and has given that policy a driver with what it calls "[capitalism with Chinese characteristics](#)," which turns out to be not profit-centered but national goal-centered capitalism.

One result of Chinese goal-centered capitalism has been the decline of North America's and Western Europe's dominance as the industrial manufacturing and technological innovation centers of the world. The very same Chinese consumer market for manufactured goods that caused a boom for Western OEMs has been redirected to favor Chinese domestic OEMs to move China into its new era of the policy of dual circulation, the gradual substitution of domestic consumption for export markets.

Western politicians are frantic to keep their consumer products' boom going, so they are paying lip service to the notion of a consumer oriented free-market economy based on profit while more

and more (disastrously) trying to manipulate that same consumer market demand without any real understanding of supply economics.

The best example of the failure of the Western approach is the looming and unnecessary energy poverty creating a political theme of an amorphous danger (aka as “boogeyman”) called climate change, a “crisis” being used to attempt to manipulate consumer demand through concepts called “clean energy” and the “Green Economy.”

Nowhere is there a better example of this than the current political mania for the electrification of transportation power trains. Self-described “experts” and “analysts” confidently predict the market penetration of so-called EVs, electric vehicles, over the next decade and well beyond. But [these predictions](#) fail miserably when analyzed through the prism of what is known about the existence, accessibility, volumes, and economics of deposits of the critical technology metals that would need to be present for such predictions to be viable. Further analysis of the current production, distribution and use of electricity is necessary.

Ninety nine percent of the world’s transportation runs on oil based fuels, the distribution of which is in effect universal. The same cannot be said for electricity.

The recent breathless coverage of weather “extreme” events, drought in California, hurricane in Louisiana, and flooding in New York and New Jersey have two things in common; one is that they are blamed on “climate change”; and a second thing, that no one in journalism seems to have noticed, that all of, and each of, these events have dramatically reduced or eliminated the flow of electricity to consumers in the affected regions, not just by generation reduction but primarily by disrupting the

distribution of reliable electricity.

Imagine, for a moment, that you are a perceptive observer of the U.S. electrical energy production industry and of its distribution industry. (Note, you therefore couldn't and wouldn't be a mainstream media journalist). How would "greened" emergency services, for example, be able to fulfill their charge (excuse the pun) without reliable continuous electric energy production? The answer is that they will rely and always must rely on fossil fueled vehicles and localized electric generators.

Now further imagine that such fuels and vehicles have been made extraordinarily expensive due to the increased costs (due to supply reduction following forced demand reduction) of fossil fuels, storage batteries, and the need for reliable backup power generation.

The legacy power distribution systems of America and Europe cannot even today cope with extreme weather events and government paid emergency services can only function with off-the-grid power sources. China has a lesser problem, because its electric power generation and distribution are being built on a national scale with exactly the problem, the interruption of power distribution, I am describing being considered and taken into account by China's industrial policy execution bureaucracy.

How would (will) a California city, such as Los Angeles, function in a heat wave/drought when the choice is between air conditioning or charging your electric car? The famous "Valley" society of the Los Angeles complex grew originally after World War II with "all electric homes."

How will steel, aluminum, and copper be mined, refined, and fabricated without baseload, continuous and reliable, electric

power to sustain the enormous continuous drains of power that batteries cannot sustain? Such flows cannot be created or sustained by solar panels and wind turbines.

And note that without a steady increase in the production of copper, which is refined ELECTROchemically and melted in electric furnaces, there can be no clean or green energy transformation. And that there can be no production of the companion metals upon which our electronics depend without massive production of the base, structural metals, within which they occur in tiny quantities. So, paradoxically and ironically, mining will have to increase manyfold and baseload fossil and nuclear electric generation would have to be increased dramatically to sustain the flow of scarce technology metals for the “greening” of society.

There is, of course, an alternative. Electricity for air conditioning, lighting, and transportation can be allocated by privilege, I.e., economic class. The wealthy and their servants will have all that they need and the rest will simply exist in a dry, hot world of water and food rationing. Politicians by the way will rate as “servants” of the wealthy. That must be what the Western politicians think, because that is the world they are creating.

The real question is: Will the climate change “crisis” collapse the fragile democracies of the West before anyone comes to their senses outside of China. Note that China already has secured sufficient supplies of all the metals it needs to avoid the supply crisis now barreling down on the West.

Critical Materials: A Root Cause of the Decline of American Manufacturing Pre-eminence

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Why has China become the dominant player in manufactured goods requiring non-fuel natural resources? Has the American governing class set up China as a straw man for its own failure to secure the American economic dominance gifted to the country by World War II? I think the answer to the second question is “yes,” and the answer to the first one is that China’s economic planners think of the long term both for goals and what is physically necessary to achieve them.

The root cause, aka “the reason for...”, the decline of American manufacturing pre-eminence is short-term thinking and planning by management. American OEM CEO’s in the increasingly long-ago pre-Sinocentric world delegated day-to-day management details to subordinates and looked at the “big picture,” aka, the long-term view. Today’s Chinese, and I think, many European, OEM CEO’s still do manage in this fashion.

Case-in-point: Securing long-term supplies of [critical raw materials](#). In America, this has now become a crisis to be managed as are all American crises as if it were only a political problem not as a problem of blind self-interest and stupidity to be rectified by opening the eyes and the mind to reality and taking action. Americans need someone to blame. Enter the Chinese, who using the attitude of wartime Americans have lifted their nation from poverty to near-preeminence in just a little more than a generation! The current fashion in

America to blame “racism” as the root cause of all evil and failure doesn’t work with the Chinese who see their own race as the superior one and who point to their economic miracle as the proof of the superiority of their nation and their economic system, Socialism (Capitalism?) with [Chinese Characteristics](#).

China is now embarked officially on its “New Economy” program shifting emphasis from manufactured goods for export to domestic consumption and actively promoting domestic innovative technological development for the purpose of making China’s economy independent of the rest of the world and domestically self-sufficient. In other words, their new economy is the opposite of Capitalism with Global Characteristics, the current American system.

I am describing the American industrial economy as Capitalism with Global Characteristics to contrast it with China’s self-described overall economy as “Socialism with Chinese Characteristics” with its corollary, “Capitalism with Chinese Characteristics” used within China to describe its own industrial economy.

China has developed the world’s pre-eminent domestic manufacturing economy with state overseen control of the production of domestic natural resources and the acquisition of a secure supply of necessary imported critical materials. Unlike America and Europe, though, it has cemented, rather than abandoned, its self-sufficient domestic manufacturing economy with secure supplies of the critical raw materials it needs and the domestic processing capability and capacity to maintain it.

China has outsourced some low-level consumer production to other countries, but these are countries that are economically dominated by China, such as Vietnam. China’s importation of critical raw materials is more sophisticated. Its African

suppliers are economically enthralled, and its American, Australian, and Canadian raw material suppliers are economically entangled by China's position as the world's largest importer of mineral ores. Without Chinese demand, the global mining industry would be an order of magnitude smaller.

With a secure self-sufficient manufacturing economy firmly in place, China is embarking the last stage of using Capitalism with Chinese characteristics to achieve Socialism with Chinese Characteristics, the development of an independent technology based economy consisting of semiconductor, computer manufacturing and programming, artificial intelligence, robotics, electrified transportation, space exploration, nuclear engineering, and chemical engineering all to achieve total independence and superiority and maintain both.

The Chinese Communist Party seems to have learned from the failure of Nazi Germany, Soviet Communism, and Maoism that industrial policy can be made to work without total control of industry by the state (fascism and Soviet communism). The United States seems not to have learned how to compete with China, and in the United States, only the [Defense Department](#) exercises a loose form of industrial policy. If there is to be only one dominant industrial (and military[?]) power in the world the game isn't over, but I think we're in the final quarter of that game.