by Gal Luft, March 22, 2010

Despite the recent failure of the Copenhagen climate summit to produce a binding treaty for greenhouse gas reduction, in the coming years the share of renewable energy in our energy portfolio is expected to grow significantly. But as the world moves away from fossil fuels, industrial minerals like lithium, cobalt, indium, gallium, tellurium, vanadium, and chromium, to name a few, are becoming increasingly strategic and failure to ensure their supply could not only strip the green revolution of any meaningful content but also create unnecessary national security vulnerabilities for the U.S.

The compact energy-efficient fluorescent light bulbs we will be forced to use since Congress has essentially banned incandescent light bulbs require for their manufacturing europium, cerium, terbium, and yttrium. All four belong to the group of 15 successive metals on the periodic table called rare earth elements, which are also employed in hundreds of technologies and from Blackberries to radars and precision guided bombs. One member of this family, Lanthanum, is a critical element in the production of nickel metal hydride batteries currently used in hybrid cars and electric scooters. Another member, Neodymium, is essential for the production of magnets used in electric car motors as well as in the electric generators of large wind turbines. The magnet utilizing generator of one wind turbine could take as much as half a ton of neodymium.

This is a lot considering that global Neodymium production in 2008 stood at 17,000 tons, most of it used in critical applications like computer drives, mobile phones, MRI machines, fuel cracking catalysts, glass and air conditioners. Cadmium, copper, indium, gallium, selenium, and tellurium are all used in thin-film photovoltaic solar panels. Advanced auto batteries all contain scores of other metals including cobalt, lithium, manganese and nickel. The lithium requirement of President Obama's plan for the auto industry to deploy one million plug-in hybrids by 2015 is equivalent to the current needs of the global battery market for portable electronics including power tools, cell phones and computers.

The good news is that the earth is rich in all of the above metals and peak lithium or cobalt are nowhere on the horizon. Even those "rare earth elements" are not so rare. The bad news is that we are lagging behind in securing their supply commensurate with the green hype coming from Washington. Worse, despite its wealth of technology metals, U.S. domestic production of most of them is almost zero. Instead, we prefer to rely on foreign countries (Chile and Argentina for lithium, the Democratic Republic of Congo for cobalt, and China for rare earths) for almost all of our needs.

Consider the vulnerabilities: If the epicenter of the recent devastating earthquake in Chile would

have been few hundred miles to the north we would be today in a midst of a painful lithium supply shock as Chile supplies 40 percent of the world's demand. If the civil war in Congo, a tragedy that has already claimed more lives than the Holocaust, intensifies a cobalt crisis cold soon ensue as half the world's reserves of this commodity are concentrated there. The dependence on Chinese rare earths is perhaps the most troubling. Today China supplies more than 95 percent of the world's demand. But in recent years China's ability - and willingness - to export rare earths has eroded by 30 percent due to its growing domestic demand and the government's mandate to consolidate the industry by decreasing the number of mining permits.

Just like a chain is only as strong as its weakest link, our energy future can only be as viable as our ability to supply the most obscure of its ingredients. Managing future supply of critical metals will require a joint effort by government, industry and relevant constituencies to lift barriers to domestic minerals production.
Congress and the Obama administration should assess the projected usage of technology metals in the supply chain of the Department of Defense and determine the needs associated with implementation of any energy and climate legislation currently under consideration in Congress. The administration should also assess the national security implications of supply disruptions of such metals and detail the steps that the U.S. government should take to address any such risk to national security.

Clean energy advocates for their part should realize that the road to a green economy begins at the mine and that steep mining taxes, heavy-handed environmental regulations and designation of millions of acres where essential minerals can be found as wilderness preserves will create unnecessary roadblocks to their vision.

No industrial nation can be totally self-sufficient, but if we are to be dependent we must ensure that this dependence is carefully managed and that no single country can control the supply chain of industries critical to our existence. Like with oil, we must have stockpiles of essential materials sufficient for times of emergency, while our foreign policy establishment should begin to consider how our future energy needs might impact our foreign relations particularly since—as with oil—so many of the specialized materials are concentrated in unstable and potentially adversarial countries like Bolivia (27 percent of world lithium reserves), Congo and China.

The energy challenge we face cannot be addressed through faith-based energy policy but only through one that systematically addresses the entire supply chain of each component of our energy future, carefully identifies the bottlenecks and provides solutions to open them. Without such a comprehensive mine-to-wheel (or mine-to-socket) approach, the green revolution will remain a field of dreams.

Gal Luft is executive director of the Institute for the Analysis of Global Security (IAGS) and coauthor of Turning Oil into Salt: Energy Independence through Fuel Choice (2009) and Energy

Security Challenges for the 21st Century (2009).