MA DPU 21-90, 21-91, and 21-92 Comment of Patricia Burke

Attachment: Lithium Mining: The Hidden Environmental Cost of EVs *and* Will the Race for Electric Vehicles Endanger the Earth's Most Sensitive Ecosystem? Oceans

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Lithium Mining: The Hidden Environmental Cost of EVs

By Charles Komanoff

Feb 9, 2021

Editor's note: This article originally appeared on the website of the Carbon Tax Center. It is republished here with permission.

Though I've hiked all over the west, I've never been to Nevada's northwest corner. On the map it's a broad, empty strip from I-80 to the Oregon line. For hundreds of miles, it is in fact wild country — and far from empty, biologically, ecologically.

In January, a pair of activists, Will Falk and Max Wilbert, pitched a tent in one of the loveliest valleys of the region, seeking to rally resistance to a proposed lithium mine on public land. The place where they've established their protest camp is called Thacker Pass.

Lithium is a metal, and its physical and chemical properties make it versatile enough to be baked into lubricants, ceramics and other useful stuff, including batteries. Lithium-ion batteries, invented in the late 1970s and prized for their energy density and rechargeability, are integral to two pillars of the Green New Deal: electric vehicles and power storage.

Falk and Wilbert, camped out in midwinter cold, enduring what is no doubt some small privation, are asking that we recognize the ecological and environmental cost of the so-called sustainable economy, at the center of which is the mining of lithium. We need to understand why they are taking a stand at Thacker Pass.

Here's how they describe where they are right now:

"Thacker Pass is a physical feature in Humboldt County, Nevada, part of the McDermott Caldera approximately 60 miles northwest of Winnemucca. It was formed 16 or more million years ago, is traditional and unceded territory of the Paiute Nation, and is United States Bureau of Land Management public land.

Now it is also the proposed site for a massive lithium mine that would destroy the area and valuable habitat for the creatures who live there."

A Less Than Green New Deal?

Climate campaigners have decreed that the world's cars and trucks must switch to electricity — an imperative that was boosted by General Motors' recent announcement that it intends to sell only electrics after 2035. Climate hawks say biodiesel can't be done at scale and hydrogen vehicles are years from commercial use, and they're right, not when American households and businesses own 275 million cars and trucks and drive them over 3 trillion miles each year — making "ground transportation" the country's biggest source of planet-heating carbon dioxide emissions.

Key to the green idea for transportation is to make wind and solar power so plentiful that the electric grid will no longer need generators running on fossil fuels. Electric vehicle battery re-charging — and driving — will then be emission-free and climate-pure.

Of course, a renewables-based grid is subject to fluctuating output from the wind farms and solar arrays. That's where lithium's other GND connection comes in: powering massive rechargeable battery stacks that can feed electricity into the grid for hours at a time, continuously stabilizing electricity supply.

Already, giant assemblages of lithium-ion batteries are sprouting up in California, where renewable energy has penetrated furthest, enabling utilities in the state to close some turbines burning fracked methane.

The Green New Deal, the anointed framework for perpetuating industrial civilization as we know it while creating jobs and a "just transition" from the fossil-fuel economy, is clearly better than our carbon-based catastrophic course. It also depends on massive amounts of lithium.

I figure that electrifying all U.S. cars and trucks in two decades, as envisioned in GND scenarios, will demand the continuous lithium output of three to five Thacker Pass mines.

Powering "utility-side" grid-smoothing batteries will require still more. How much, I do not know. An extensive literature search turned up not a single statement of the quantity of lithium needed per gigawatt-hour, say, of electricity storage — an indication, perhaps, of the alienation of Green New Dealers and energy scenario-spinners alike from the physical implications of their intentions.

Lithium = Devastation

One reason for Falk and Wilbert's stand is obvious: the lithium mine at Thacker Pass will destroy an entire sagebrush ecosystem. Mind you, what's planned at Thacker Pass isn't just an epic-sized mine. There will also be an enormous complex to extract lithium from the mined ore for its conversion into a non-volatile carbonate form to be made into batteries.

Because lithium's concentration in ore at Thacker Pass runs as low as two-tenths of one percent, producing one ton of the stuff for use by society entails strip mining and processing as much as 500 tons

of earth. Over a single year, producing 60,000 tons of lithium at the site could mean digging up as much as 20 to 30 million tons of earth, more than the annual amount of earth dug up to produce all coal output of all but seven or eight U.S. states.

Removing the lithium from the ore is done with the industrial economy's dissolver of choice, the notoriously corrosive and toxic sulfuric acid. The developer, Canada-based, China-backed Lithium Americas Corp., plans to acidify molten sulfur on site, trucking in the stuff from oil refineries. Hauling the material will require 75 tractor-trailer loads a day, according to Falk and Wilbert — every one of them running on fossil fuels.

Unsurprisingly, the processing equipment is budgeted at a dozen times more than the mine itself, in Lithium Americas' "pre-feasibility study" (pdf, p. 228 of 266), with the whole enterprise topping out at more than a billion dollars. You don't spend that much money on apparatus to move, crush, leach and acidify earth without scarring and contaminating large swaths of it.

Thus, the "Protect Thacker Pass" banner. There's a lot to protect. On the encampment's web site, Falk and Wilbert describe Thacker Pass as "a stunningly biodiverse, wild, expansive, and beautiful desert in the mountains." In mid-winter, they attest that the land practically vibrates with stars and stillness.

The pair's real aim at Thacker Pass is to question a Green New Deal that is dependent on large-scale resource extraction and industrial manufacture. Which means questioning not just society's but the environmental movement's acquiescence to consumerism and material growth.

Where is it written, they ask, that Americans must own 275 million vehicles? Where is it written that we can't halve that number, to Western European levels, with denser suburbs and Euro-quality transit along with broad cultural changes substituting place and proximity for pointless travel, thus slashing the "need" to replace all those cars and trucks with electric vehicles built from mined lithium? As for grid storage, rate incentives that harmonize electricity usage with its real-time availability could partially supplant batteries. Smaller homes and less air-conditioning of buildings could also trim power demand, period.

Tightening the Regulatory Screws Would Help

Would it also make a difference if the pollution discharges permitted at Thacker Pass and at other lithium mines were cut ten-fold? I believe so. This wouldn't just reduce ecological degradation in the immediate areas. The cost to comply with those regs would boost the price of lithium carbonate. The responses to the higher price — ranging from lighter vehicles that can get by with smaller battery packs to potentially more-efficient (hence, less-resource-intensive) energy storage media — would cut demand.

GM's Hummer EV: bullshit on our streets, bullshit in our wild lands. Courtesy the author.

The U.S. has already witnessed just such a chain of events: with coal-fired power plants. To satisfy regulatory mandates to cut new plants' soot emissions and acid gases roughly ten-fold, utilities were forced in the 1970s and 1980s to spend billions for scrubbers, precipitators and the like, driving up

prices of new coal-fired plants — a progression I documented at the time. Coupled with even more meteoric cost escalation at nuclear power plants, the result was spiraling electric rates that helped spark the revolution in energy efficiency that has all but extinguished growth in electricity demand in the United States.

There, in a nutshell, is the logic behind carbon taxing: to raise prices of fossil fuels in accordance with their true costs, thus spurring reductions in their use. Lithium, no less than coal, oil and methane, should be forced to adhere to the same dynamic. If electric vehicles and carbon-free grids are rendered more expensive for awhile, so be it.

Industrial civilization is still destroying ecosystems, laying waste to biodiversity, ramping up its plunder of forests, consuming more metals than ever, depleting ocean life at ever-increasing rates…and on and on… One antidote is for prices to speak the truth about underlying costs.

Nevertheless, even my regulatory-based scenario has a weak link: global commerce. Make it cost more to mine lithium in the USA, and global capital will alight elsewhere. Lithium Americas already operates a mine in Argentina, and the mineral is widely distributed around the world.

To evade the Whac-a-mole trap, the fight that Falk and Wilbert are mounting in Nevada has to be waged as well in Argentina, Australia and especially Chile, the world's biggest current provider. It's a tall order.

First, though, they have to stop the mine where they're camped, at Thacker Pass. That's a tall order too. That lithium is a midwife to a low-carbon economy makes it less ugly than coal and less evil than oil. But all the same, it's a force that is industrializing the entire planet, to Earth's and our detriment and, possibly, demise.

A True Sagebrush Rebellion

Reporting in 2015 on deadbeat cattle rancher Cliven Bundy's armed standoff over federal grazing fees, journalist Christopher Ketcham wrote in Harper's that the so-called Sagebrush Rebellion — the Western resistance to federal authority over public lands and water — has always been centered in Nevada. That rebellion proffered the noxious idea that public lands should be maximally exploited for private gain.

The rebellion of Falk and Wilbert, situated in the same sagebrush wilderness, seeks the opposite: "A world in which we prioritize the health of future generations. A world in which we live in harmony with the natural world, rather than relying on extraction. A world in which blowing up a mountain for lithium is just as unacceptable as blowing up a mountain for coal."

For information on donating, supporting, communicating or coming to Thacker Pass and joining the lithium mine blockade, click here.

https://usa.streetsblog.org/2021/02/09/lithium-mining-and-the-hidden-environmental-costs-of-evs/

Will the Race for Electric Vehicles Endanger the Earth's Most Sensitive Ecosystem?

Materials needed to make the batteries for electric cars and other clean technology is driving interest in deep-seabed mining, and scientists fear the cost to the ocean will be steep.

Oceans & Clean Water March 10, 2021 - by Tara Lohan

The internal combustion engine had a good run. It helped get us to where we need to go for more than a century, but its days as the centerpiece of the automotive industry are waning.

As countries work to cut greenhouse gas emissions, electrification is stealing the limelight.

While there's still a long road ahead — electric vehicles only accounted for 3% of global car sales in 2020 — EV growth is finally climbing. From 2010 to 2019 the number of EVs on the road rose from 17,000 to 7.2 million. And that number could jump to 250 million by 2030, according to an estimate from the International Energy Agency.

The growing demand for electric vehicles is good news for limiting climate emissions from the transportation sector, but EVs still come with environmental costs. Of particular concern is the materials needed to make the ever-important batteries, some of which are already projected to be in short supply.

"Climate change is our greatest and most pressing challenge, but there are some perilous pathways to be aware of as we build out the infrastructure that gets us to a new low-carbon paradigm," says Douglas McCauley, a professor and director of the Benioff Ocean Initiative at the University of California Santa Barbara.

One of those perilous pathways, he says, is mining the seafloor to extract minerals like cobalt and nickel that are widely used for EV batteries. Extraction of these materials has thus far been limited to land, but international regulations for mining the deep seabed far offshore are in development.

"There's alignment on the need to go as fast as we can with low-carbon infrastructure to beat climate change and electrification will play a big part in that," he says. "But the idea that we need to mine the oceans in order to do that is, I think, a very false dichotomy."

Supply and Demand

Tesla may have made owning an EV cool, but a slew of other companies now hope to make it commonplace.

The latest is Volvo, which announced at the beginning of March that it will make only electric cars by 2030. This follows news that Jaguar will be all-electric in 2025 and Volkswagen after 2026. General Motors says it's aiming to make its cars and light trucks electric by 2035, while Ford is doubling its investments in EVs and plans to sell only electric cars in Europe by 2030.

There are a number of factors that will determine how quickly people adopt the technology — charging infrastructure, battery range, affordability — but top of mind for some is manufacturers' ability to keep

production pace, particularly when it comes to the lithium-ion batteries that are used in not just EVs but other technologies like cell phones and laptops, as well as energy storage for solar and wind.

A 2019 study by the Institute for Sustainable Futures at the University of Technology Sydney found that demand for lithium could exceed supply by next year, which would drive up prices and interest in more lithium mining. Demand for cobalt and nickel, also key battery components, will exceed production in less than a decade.

“Cobalt is the metal of most concern for supply risks as it has highly concentrated production and reserves, and batteries for EVs are expected to be the main end-use of cobalt in only a few years,” the report’s authors found.

Vying for control of these crucial materials has geopolitical implications. Right now, many of the materials are concentrated in a few nations’ hands.

Most of the cobalt used in batteries today is claimed by China from mines in the Democratic Republic of Congo, where extraction has come with human rights abuses and environmental degradation. Most of the global lithium supply is found in Australia, Chile and Argentina.

Supply-chain issues have also caught the attention of President Joe Biden, who issued an executive order in February directing the secretary of Energy to identify “risks in the supply chain for high-capacity batteries, including electric-vehicle batteries, and policy recommendations to address these risks.”

As pressure mounts to claim terrestrial minerals, commercial interest is growing to extract resources from the deep seabed, where there’s an abundance of metals like copper, cobalt, nickel, manganese, lead and lithium. Investors already expect profits: One deep-sea mining company recently announced a plan to go public after merging with an investment group, creating a corporation with an expected $2.9 billion market value.

But along with that focus comes increased warnings about the damage such extraction could do to ocean health, and whether the sacrifice is even necessary.

The Deep Unknown

The high seas are “areas beyond national jurisdiction,” and mining their depths will be managed by an intergovernmental body called the International Seabed Authority.

The group has already approved 28 mining contracts covering more than a million square kilometers (360,000 square miles). It’s still drafting the standards and regulations for operations, but when companies get the go-ahead they’ll be after three different mineral-rich targets: potato-sized polymetallic nodules, seafloor massive sulphides and cobalt-rich crusts.

But there’s also concern that we still don’t adequately understand the risks of operating giant underwater tractors along the seafloor.

“There are a lot of conversations about the real risks and unanswered questions about ocean mining,” says McCauley. “There’s now more than 90 NGOs that have come out and said that we need a moratorium on ocean mining and we shouldn’t be sprinting to do this until we are able to answer some of the serious questions about the impact of mining on ocean health.”

The deep sea is one of the least-explored places on the planet, but we know that these dark depths are teeming with life and are interconnected with other parts of the ocean ecosystem, despite often being 10,000 feet deep or more.

“These spaces out in the high seas, which include undersea mountain ranges, are really quite biodiverse and they’re full of very unique species,” says McCauley.

That includes “Casper,” a newly discovered, ghostly white octopus; the sea pangolin, a snail that lives on hydrothermal vents; and black coral, which can live thousands of years.

The deep seabed is also home to countless species we don’t even know exist yet and a large diversity of carbon-absorbing microbes that build the base of the ocean’s food chain.

Extracting minerals from the deep sea could put thousands of these species at risk from the direct impacts of the mining operations, as well as the associated light and noise. Plumes of sediment from discarded mining waste pose another danger.

“Those plumes could be quite large and persistent and could have a smothering effect on ocean life,” says McCauley.

That could even be bad for those of us onshore.

A report by the Worldwide Fund for Nature found that “the loss of primary production, for example, could affect global fisheries, threatening the main protein source of around 1 billion people and the livelihoods of around 200 million people, many in poor coastal communities.”

There’s also the potential that mining the deep seabed could affect our ability to cope with a changing climate. Currently the deep sea is what McCauley calls “a big bank of safely stored carbon.” He says “there’s a lot of unanswered questions about what would happen if you actually started redistributing that carbon back into circulation in the oceans. This isn’t the time that we want to be doing grand new experiments in an ecosystem like the ocean, which is our biggest ally in storing carbon.”

Another big concern is the ability of the deep ocean ecosystem to recover from disturbance.

“It’s such a special place biologically and physically,” he says. “It’s essentially a slice of the planet where life just moves slower and in a way that we don’t see anywhere else.”

Species at these depths tend to live a long time, take a while to reproduce and have low fertility rates. “And that means that life recovers more slowly than the other parts of the planet,” he adds.

A small-scale simulated mining experiment done in 1989 proved just that. “Scientists have returned to the site four times, most recently in 2015,” an article in Nature explained. “The site has never recovered. In the ploughed areas, which remain as visible today as they were 30 years ago, there’s been little return of characteristic animals such as sponges, soft corals and sea anemones.”

Alternatives

In order to keep heavy machinery off the ocean floor, McCauley says we can look to promising developments in battery technologies that are helping to reduce the amount of supply chain-constrained material, like cobalt.

Most of the people designing new battery technologies probably don’t have deep-sea biodiversity at the top of their minds, he says. “They’re designing it because these batteries are cheaper, more stable and have similar performance capabilities.”

Still, the end result could help make the case for holding off on plundering the ocean’s riches.

Cobalt has long been considered a key stabilizing component in lithium-ion batteries, but new chemistries have begun to whittle down the amount of cobalt needed. EV batteries containing the previous mix of equal parts nickel, manganese and cobalt in the cathode — or negatively charged electrode — can now be replaced with 80% nickel, 10% manganese and 10% cobalt. These batteries, known as NMC 811, are already being used in electric vehicles in China.

“So we’ve reduced the amount of cobalt from 33% down to 10%, but if you look at the projections of electric vehicles by 2030, it’s going to be hard to have even 10% cobalt in the cathode because of the limited cobalt reserves that are available,” says Matthew Keyser, a mechanical engineer with the National Renewable Energy Laboratory.

That means that new developments are now trying to move away from cobalt entirely. But that may end up shifting demand to another metal — nickel, which is fast becoming the most valued mineral for EV batteries and could still put the ocean on the target list.

Batteries made with lithium manganese oxide or lithium iron phosphate are new alternatives that don’t require nickel, but Keyser says they’re still not ideal.

“They have lower energy densities and they don’t work as well in vehicles,” he says. “The ultimate thing that we’re all trying to [achieve] is a battery with lithium sulfur, because sulfur is widely available.”

Working out the kinks in that technology is still five or 10 years away, he estimates.

Beyond changing the chemical composition of batteries, we can also help reduce demand pressure on scarce minerals in other ways.

“Instead of mining the oceans we can do a better job of mining the wrecking yards where EVs will be, which is to say doing a better job with recycling batteries,” says McCauley.

Currently only about 5% to 10% of lithium-ion batteries are recycled. In part that's because the process is still more expensive than acquiring most of the raw materials. It's also complex because the different variations of lithium-ion batteries on the market today each require a different recycling process.

But earnest efforts are underway to sort that out. One is Redwood Materials, started by Tesla co-founder J.B. Straubel, which says it's the largest battery recycler in North America and can recover 95-98% of elements in batteries like nickel, cobalt, lithium and copper.

There's concern that recycling can't meet short-term demand because there aren't enough batteries ready for recycling yet, but researchers believe it will be useful as a long-term solution for reducing scarcity.

"Recycling is going to be key," says Keyser. "It's going to be very important in the future and we need to do better than what we're doing right now."

Research also suggests that demand for EV cars with higher driving ranges increases the size of the batteries needed and influences the materials chosen to make them. But we can shift our technology, personal expectations and driving behavior.

Fast charge stations for electric cars in Canada. Photo: Duncan Rawlinson, (CC BY-NC 2.0)

"The introduction of shared-mobility services and establishing thorough charging networks can … significantly reduce material demand from the transport sector," the WWF report recommends. "Other technological developments that can reduce material demand are advances in widespread charging infrastructure to increase the range of small-sized battery EVs as well as improved battery management systems and software to increase battery efficiency."

McCauley hopes that a combination of advances will help take the pressure off sensitive ecosystems and that we don't rush into mining the seabed for short-term enrichment when better alternatives are on the horizon.

"One of my greatest fears is that we may start ocean mining because it's profitable for just a handful of years, and then we nail it with the next gen battery or we get good at doing low-cost e-waste recycling," he says. "And then we've done irreversible damage in the oceans for three years of profit."

https://therevelator.org/ev-batteries-seabed-mining/