

and Brian Lentz think they have found an answer by extracting cobalt, copper and nickel from industrial waste streams.

The Minneapolis-based geologists that own Big Rock Exploration and several mining-related firms have formed a developmental stage [company](#) called Exsolve Recycling Technologies to mine the industrial waste for the short-in-supply metals.

Bergmann and Lentz note that the majority of industrial waste is exported, primarily to China. Valuable commodities are then extracted there and sold back to U.S. entities at market rates.

Bergmann and Lentz view that process as a lost economic opportunity for the U.S. and a business opportunity for them. Recognition of that problem was the genesis of Exsolve, years before they officially started the company in 2017. Their new company is also part of a relatively new segment of the recycling industry.

"Here in the U.S. at least, there doesn't seem to be anyone tapping into these waste streams with the approach that we are in recycling them and getting the value metals out," Lentz said. "The more we look the more we are finding."

Bergmann and Lentz are partnering with Bill Fisher of National Research Co., whose facility in Michigan has been reclaiming industrial diamonds from similar waste. Over the years, National Research has tweaked its process to also reclaim valuable metals.

At the fully permitted and zero-emissions facility, the two companies already have done bench scale tests to prove their proprietary process works. They also have secured a supply of industrial waste, are getting ready for a pilot study and have broken ground on a 15,000-square-foot expansion to the plant in Michigan.

Bergmann and Lentz had a good year with Big Rock Exploration, though there were pandemic-caused limitations, including the closed Canadian border, that limited some of their field work. They also had a short shutdown due to stay-at-home orders.

The slower pace in 2020 allowed them to focus on the development of some related companies, among them Exsolve.

"The pause in business was a blessing in disguise for Brian and I to recalculate and really amplify a lot of these other things that are ready to be put out into the market," Bergmann said. "We were successful in getting three new entities basically rolling."

Besides Exsolve, the two also jump-started two mining-specific projects—Relevant Copper and Relevant Gold, which aim to discover and develop economically sustainable mining operations in the U.S. Those two are formed as Canadian parent companies with U.S. subsidiaries. The eventual aim for those companies is to list them on a Canadian stock exchange that has more experience with listing junior mining exploration companies.

Exsolve of the three is the furthest along in commercialization. They are also considering licensing the Exsolve technology to other companies.

A 2020 report from the U.S. Department of Energy highlights how vulnerable the U.S. economy is to sources of critical materials. The report states that 60% of the world's cobalt is mined in the Democratic Republic of the Congo, and 80% of that supply is processed in China.

Bergmann and Lentz envision a closed-loop economic cycle for reclaiming those critical materials already here in industrial waste. Ironically, one of their sources are the spent drill bits used in geological exploration and mining.

President Joe Biden signed an executive order on Feb. 24 asking for a 100-day review of America's supply chains to find more resilient, diverse and secure sources for all manner of objects including critical minerals.

Other companies also are looking at new ways of recycling to supply the critical minerals needed for EV batteries. But many of those companies are looking at ways to recycle spent lithium ion batteries to reclaim critical minerals.

Argonne National Laboratory in Lemont, Ill., has a ReCell Center that, working with academia, industry and other national laboratories, is advancing recycling methods to improve the economics of battery recycling for the life cycle of current and future battery technologies.

Jeff Spangenberger, who leads the ReCell group, said recycling can give the U.S. additional domestic supply of critical metals.

"We don't produce most of the material that are in our batteries, so if we can buy them once, keep them here, that creates a big advantage for us," he said.

So far, Bergmann and Lentz have kept funding pretty close to home, with the most recent round of financing from founders, friends and family. They are eager to reward those investors with an eventual public offering of Exsolve or the two mining companies Relevant Copper and Relevant Gold.

All the deals are independent and structured differently.

"It gave us the ability to more rapidly push one of them toward that public listing point, hopefully in 2021," Bergmann said.

It helps, too, that those friends and family members have a clear understanding of their goals of finding domestic, responsible and sustainable sources of critical minerals.

"A lot of the same people came into all of the ventures and we saw that as a big boost of support in us and the projects we have going on," Lentz said.

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