This B.C. startup CEO sees treasure in tailings trash — and he's got a new round of investment to keep digging

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Some entrepreneurs hope the yawning gap between copper supply and skyrocketing demand could be filled, at least in part, in mine tailings.

With his shock of prematurely white hair and his novel idea for extracting new value from mine waste, Mohammad Doostmohammadi almost has the air of a mad scientist about him.

But his project is far from the work of science fiction.

The Vancouver-based chemical engineer has developed a unique electrochemical processing method for combing through mine tailings to recover metals critical to the global energy transition.

Take the yawning gap between copper supply and skyrocketing demand in the age of artificial intelligence, which could lead to an annual shortfall of 10 million tonnes by 2040, according to a recent report from S&P Global Energy.

That's almost twice the annual output of Chile, the world's biggest copper-producing country.

To fill the gap, the industry would need to get approvals and build the equivalent of the world's 20 biggest existing mines.

However, Doostmohammadi says, there's an estimated 20 million tonnes of copper sitting in the spent tailings of North American mines.

"It's huge," he says, of the potential opportunity for recycling: He sees treasure in all that tailings trash.

"We are tackling the material that is already mined, that is already extracted from the earth sitting somewhere else," he said. "And we extract copper from it."

At the moment, Doostmohammadi's company, pH7 Technologies, is applying an electrochemical process that's normally used to recycle platinum metals from industrial waste. The process involves catalysts from the oil and gas industry, pharmaceutical manufacturing and even automotive catalytic converters.

The company has built a commercial-scale, 30,000 square foot recycling plant in Burnaby (Greater Vancouver).

It has also raised a $55-million round of Series B financing to fund the company's growth, including two demonstrations of the technology at mine sites in B.C. and Chile.

However, pH7 isn't alone in the tailings-recycling game.

Doostmohammadi, who founded the company during the COVID-19 pandemic, says the field is "actually getting (to be) quite competitive" with operators using a host of other chemical or biological methods for reprocessing ore.

"Because the opportunity is huge," he added.

While this surge of interest is a recent phenomenon, veteran mining executive Michael McPhie said the practice of extracting value from tailings has been around for almost as long as there has been mining.

"Mining goes back in human history a couple thousand years, and there's examples of mine waste (from) the Roman era that have been reprocessed a couple of times as technology improves," McPhie said.

The technology has improved quite a bit since the age of ancient Rome. This renewed interest in old tailings is also the result of more recent changes in supply and demand.

"Copper, gold, all the major minerals are really up in price, so all of a sudden these materials that might have been waste before, all of a sudden look quite valuable," McPhie said.

"I don't know how long that will last, but right now there's certainly a lot of interest."

McPhie, who lives in North Vancouver, is managing director of Washington, D.C.-based Regeneration Enterprises, a public benefit company that sees tailings recycling as key to restoring mine sites to their natural state.

"What we believe is you really have to think about the end state of these things as well," McPhie said. "Metal recovery should be a step toward restoration of a site. And addressing the pollution issues and things like that come from waste material that hasn't been contained properly."

Regeneration has 10 advanced restoration projects, McPhie said, including one in Yukon and one in B.C., the historic Hedley gold mine 250 kilometres east of Vancouver in Similkameen Valley.

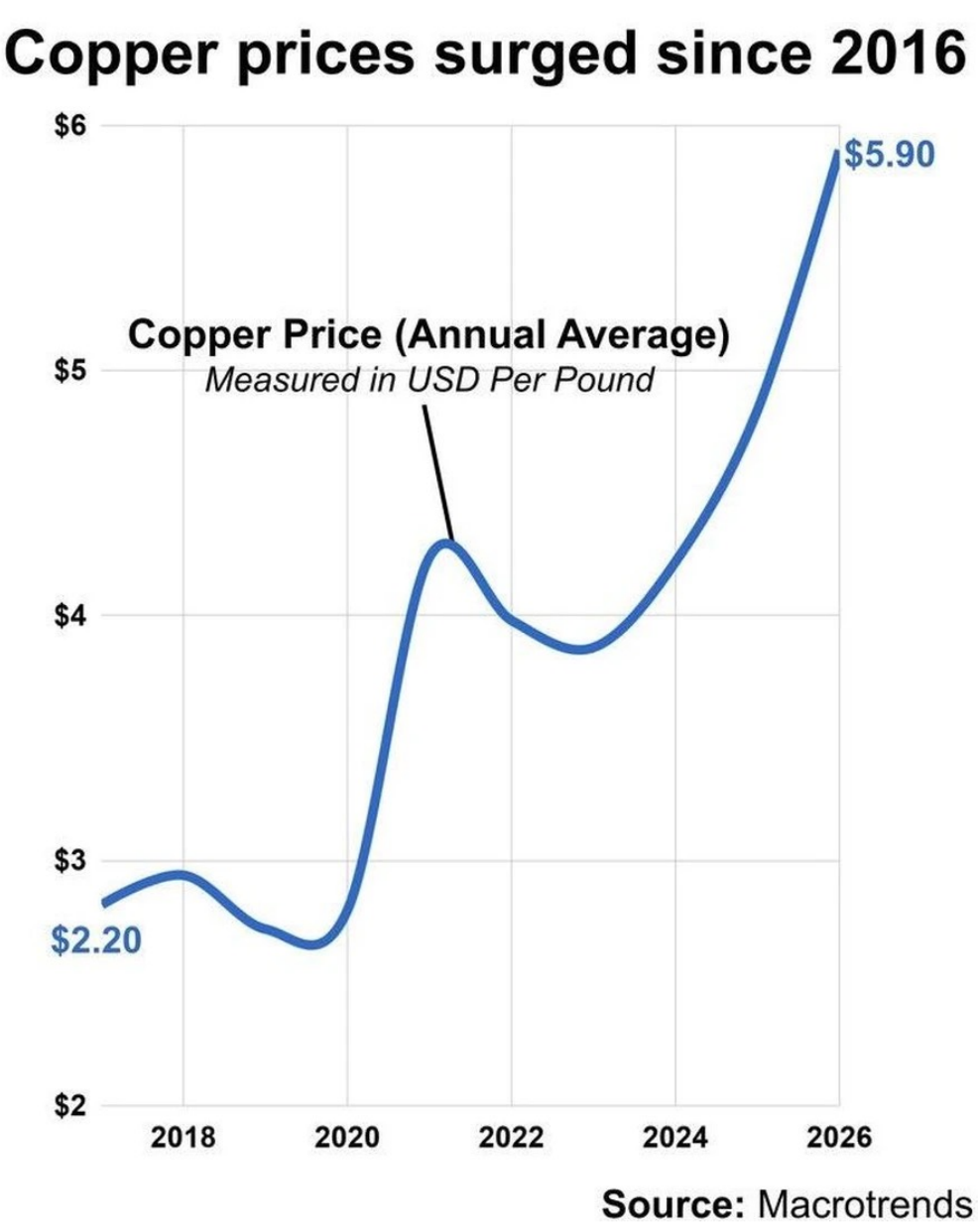
There, Regeneration will recover gold and cobalt, with a $15-million contribution from the federal agency Pacific Economic Development Canada.

Regeneration is evaluating another roughly 100 projects, and it's collaborating with "20 or 30 different companies," on their own technologies for mineral recovery.

"There's a lot of interesting stuff happening in this space," McPhie added.

While recycling tailings does have potential, analysts are skeptical about how much of the expected gap in copper supply it will be able to fill.

Aurian De La Noue, co-author of the S&P Global Energy group's landmark report, said higher prices for copper do make tailings attractive.



"However, these ores will likely have lower copper content than normal mining operations," said De La Noue, executive director for critical minerals at S&P.

"So, tailings could become part of the solution, but certainly wouldn't, in this current market, be able to bridge the 10-million-tonne gap."

At pH7, the company is also doing research and development work to expand the portfolio of metals it can extract to include nickel, cobalt, gold and silver.

Researchers, like Doostmohammadi, believe there are a lot of metals to search for in old tailings, and that mining companies have an appetite to recycle the waste to help with restoration work.

Vikram Yadav, a chemical engineer and associate professor in the Bradshaw Research Institute for Minerals and Mining in Vancouver, said that for copper alone, some estimates suggest 200 million tonnes of the metal are sitting in tailings ponds at mines around the world.

"Companies are now more willing to take risks, because some of these risks are existential to their businesses," Yadav said. "So that's created a nice mix for innovation."

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