Lithium to be extracted from geothermal waste

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Lithium ingots with a thin layer of black oxide tarnish. Image: Wikimedia Commons

(PhysOrg.com) -- A technique developed by a Californian company, Simbol Mining, will enable the valuable mineral lithium, widely used in high-density batteries, to be reclaimed from the hot waste water produced by a geothermal power plant in California.

The consumption of lithium has been increasing globally, and is predicted to triple by 2020 as lithium battery use increases, electric cars become more widespread, and as more batteries are used to store electricity produced by solar and wind sources.

The traditional sources of lithium are soil and brine dried in salt ponds, especially in Chile and Bolivia, but the waste water produced at the

geothermal power plant, which can be millions of gallons a day, is equally rich in lithium. Extracting the lithium from geothermal waste water is easier than extracting from brine, and less water-intensive than extracting from soil, and the process has a smaller environment footprint because the water has already been extracted to generate electricity.

The geothermal plant is built on top of the San Andreas Fault at the Salton Sea in southeastern California, around 80 miles east of San Diego. The plant is one of a cluster of geothermal plants that draw hot water at up to 360C from underground to the surface to produce the steam that drives electricity-generating turbines. The hot waste water produced in the process is salty and rich in silicates and minerals such as lithium.

The presence of silicates presented problems in the extraction because they tend to clog equipment, but Simbol now uses a technique developed in the Lawrence Livermore National Laboratory in Livermore, California to remove the silicates from the waste by precipitation and filtration. The filtered water is then passed over a chemical resin that draws lithium ions from the solution to form lithium chloride, and then the remaining solution is returned to the ground. Lithium chloride is not a suitable form for shipping, so sodium carbonate is added, and the mixture forms lithium carbonate, which is easier to transport.

The extraction process is partially driven by the heat of the waste water, which means the environmental impacts are fairly minimal, according to geologist Michael McKibben of the University of California at Riverside.

Simbol Mining has tested the process fully and is now constructing a pilot plant, which is expected to produce around a tonne of lithium per month. If the pilot is successful, more ambitious plants will be built. Chief Executive Officer of Simbol, Luka Erceg, said he also expects the method to be used to extract other minerals such as manganese and zinc,

since the Salton Sea is rich in minerals having, as Erceg said, "half the periodic table" in the water.

Simbol Mining's project has been aided by $6.7 million in funding from Firelake Capital and Mohr Davidow Ventures.

More information: www.simbolmining.com/