

The amount of copper needed to build EVs is 'impossible for mining companies to produce'

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Copper cannot be mined quickly enough to keep up with current policies requiring the transition to electric vehicles (EVs), according to a University of Michigan study.

Copper is fundamental to electricity generation, distribution and storage. According to GlobalData, there are more than 709 copper mines in operation globally, with the largest being the Escondida mine in Chile, which produced an estimated 882,100 tonnes of copper in 2023.

This may sound like a lot but with electrification ramping up globally it is not. The Michigan study, *Copper mining and vehicle electrification*, has focused on the copper required just for the production of EVs over the coming years.

Many countries across the world are putting forward policies for EVs. For instance, in the US the Inflation Reduction Act, signed into law in 2022, calls for 100% of cars manufactured by 2035 to be electric.

However, an EV requires three to five times more copper than petrol or diesel cars, not to mention the copper required for upgrades to the electricity grid.

"A normal Honda Accord needs about 40 pounds of copper. The same battery electric Honda Accord needs almost 200 pounds of copper," said Adam Simon, professor of earth and environmental studies at the University of Michigan.

"We show in the paper that the amount of copper needed is essentially impossible for mining companies to produce."

The researchers examined 120 years of global data from copper production dating back to 1900. They then modelled how much copper is likely to be produced for the rest of the century and how much copper the US electricity infrastructure and fleet of cars would need to upgrade to renewable energy.

The study found that renewable energy's copper needs would outstrip what copper mines can produce at the current rate. Between 2018 and 2050, the world will need to mine 115% more copper than has been mined in all of human history up until 2018 just to meet current copper needs without considering the green energy transition.

To meet the copper needs of electrifying the global vehicle fleet, as many as six new large copper mines must be brought online annually over the next several decades. About 40% of the production from new mines will be required for EV-related grid upgrades.

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The research concluded that instead of fully electrifying the entire US fleet of vehicles, they should focus on manufacturing hybrid vehicles.

“We know, for example, that a Toyota Prius actually has a slightly better impact on climate than a Tesla. Instead of producing 20 million EVs in the US and, globally, 100 million battery EVs each year, would it be more feasible to focus on building 20 million hybrid vehicles?”

Apart from EVs, copper is, of course, vital in other sectors: for instance, building infrastructure in the developing world such as an electricity grid for the approximately one billion people who don't yet have access to electricity.

“What we will end up with is tension between how much copper we need to build infrastructure in less developed countries versus how much copper we need for the energy transition,” warned Simon.

“We are hoping this study gets picked up by policymakers who should consider copper as the limiting factor for the energy transition, and to think about how copper is allocated.”

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