

# Making Batteries for All These EVs Will Require Over 300 New Mines

Satisfying global demand for lithium, cobalt, nickel and graphite will literally take hundreds of new mines by 2035



*The 2022 Hummer EV Pickup will use GM's huge Ultium battery pack to power up to three electric motors.*

Photo: General Motors

Major carmakers seem to agree that [EVs](#) are the next step for the industry, but a [lack of raw materials](#) is going to be the next hurdle the industry must overcome.

Demand for raw materials and the metals used to make EV batteries such as graphite, lithium, cobalt and nickel is already outpacing supply. According to [Benchmark](#) analysts, unless 384 new mines are up and running in the next ten years, the EV transition will be indefinitely transitional as carmakers struggle to source battery metals.

*The Ultium battery has 24-modules but uses less cobalt than previous EVs for an estimated range of 329 miles.*

Image: General Motors

If carmakers and state governments want to reach a zero-emissions future no later than 2035, the world will have to open at least 74 lithium mines, 62 cobalt mines, 72 nickel mines, 97 natural graphite mines and 54 synthetic graphite plants, as [Benchmark](#) illustrates.

That adds up to 359 mines and plants, which is about an average number of the low (336) and high count (384) of mines required, accounting for the supply of recycled materials. This is bad news for those hoping that [recycled metals](#) would yield anywhere close to all materials needed — [carmakers](#) included.

There's just no getting around the fact that millions of tons of raw materials will have to be extracted to meet demand. In 2022, global lithium supply was at 747,000 tons, but analysts say demand will have increased to a whopping 4.4 million tons by the end 2035. For reference, global lithium reserves max out at 14 million tons, according to estimates from [Volkswagen](#).



While demand will reportedly accrue to 4.4 million tons in over ten years, lithium mines can take around five years to build up to full capacity, so a head start on construction would help preempt the imminent lithium rush.

Photo: John Moore (Getty Images)

[Lithium mining projects](#) are [notorious](#) for sidestepping environmental reviews, which only adds to the urgency: it's better to start early and do it as safely as possible, instead of waiting for the last minute and rushing important impact studies. But that still leaves the issue of demand spiking in the next decade or so, which current mines are unprepared for.

Right now, [Australia](#) (not [Chile](#)) is the biggest supplier of lithium mined from ore, harvested from spodumene rocks at more than 13 mines. [Benchmarks](#) says Australia will dominate the lithium trade for the next ten years. But [China](#) easily dominates lithium processing, refining more than 75 percent of supply.

[The U.S.](#) says it no longer wants to rely on China for lithium; it plans to start its own mining and processing projects, spurred on by possible new investments and domestic sourcing requirements in the [Inflation Reduction Act](#).

Given the sheer the number of mines required, the U.S. might get a chance to open one or two or more. Just how many new lithium mines will be in the U.S. is yet to be seen, but regardless of where these are built, the point is the world is going to need more mines. Lots of them.

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