

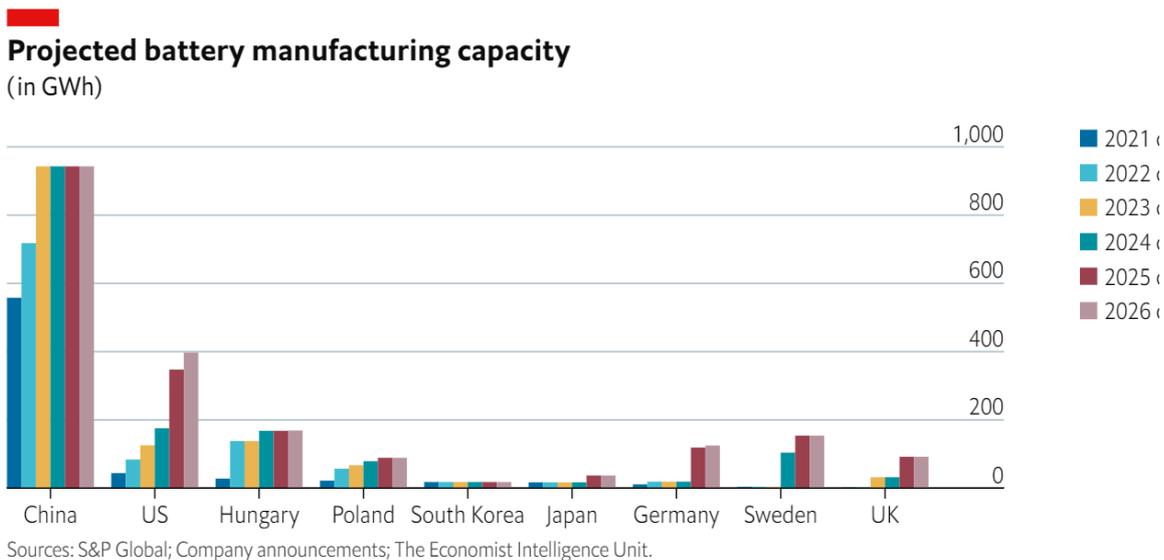
New EV battery plants face supply risks

World | Automotive | Fuel sources | Volkswagen Group

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- **Europe, the US and Asia have seen a huge surge in planned manufacturing capacity for electric vehicle (EV) batteries**
- **However, an inadequate supply of critical minerals plus a dearth of processing capabilities will be challenges for EV battery factories**
- **The geopolitical and economic tensions brought about by the Russia-Ukraine war as well as increasing opposition to mines by environmentalists and indigenous groups will hinder further investments**
- **If these risks compound, many EV battery manufacturers may reconsider opening scheduled battery manufacturing plants**

As the push for EVs grows, investment in new EV battery manufacturing plants is set to increase dramatically. Investment is likely to be concentrated in Europe and the US, but will be subdued in Asia, where countries such as South Korea, Japan and China already have some well-established EV battery plants. However, EV batteries need huge amounts of energy transition metals such as lithium, nickel, cobalt, as well as minerals like graphite. Supplying these plants with raw materials will be a big challenge in the current geopolitical climate, particularly given falling investment into new mines.



Investment in battery manufacturing is rising

Several battery plants are currently being created across the world as EV sales continue to soar. The US is one prime destination, Toyota (Japan), Honda (Japan), General Motors (US) and LG Energy Solutions (South Korea) all plan to build new EV battery plants there either separately or in joint ventures. Over in Europe, meanwhile, Hungary has attracted battery investment from Mercedes-Benz (Germany), Contemporary Amperex Technology Limited (CATL, China) and Samsung (South Korea). Volkswagen (Germany) has started to build the first of six gigafactories in Germany, while Stellantis (Netherlands) is increasing its investment into its two EV battery plants in the UK.

Projected demand for battery mining

Mineral	2022 production (tonnes)	2035 projected demand (tonnes)	Number of new mines needed	Average capacity per new mine (tonnes)
Lithium	678,000	4m	74.0	45,000

Cobalt	177,000	489,000	62.0	5,000
Nickel	3.1m	6m	72.0	42,000
Natural graphite	1.1m	7m	97.0	56,000

Source: Benchmark Mineral Intelligence

Other possible new sites for EV battery manufacturing are likely to be Slovakia (where Sweden's Volvo is mulling plans for a plant) and the Czech Republic (where Volkswagen subsidiary Skoda is already producing batteries). Sweden is also likely to be one of Volkswagen's future sites for EV battery manufacturing. In many of these countries, investment is being supported by government investments, including tax breaks, as both Europe and the US aim to reduce their reliance on China for EV batteries.

New battery capacity will strain supply chains

In planning their battery plants, carmakers have been inking deals with mining firms to secure future supply of critical minerals and metals needed to produce their batteries. Volkswagen and Mercedes-Benz have signed a memorandum with Canada to secure lithium, cobalt and nickel. Tesla (US) has also secured several deals with miners including BHP (Australia) and Glencore (Switzerland) to secure supplies of cobalt, nickel and graphite.

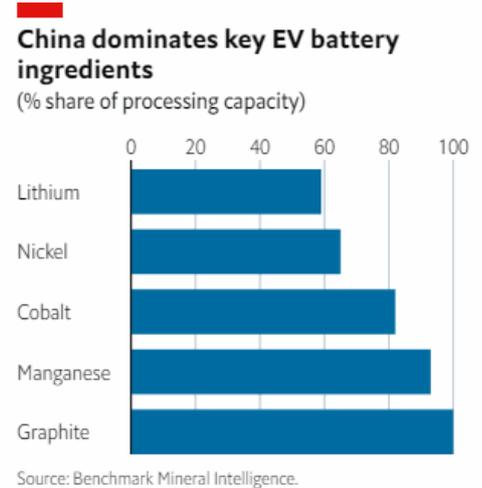
However, new mining capacity is unlikely to expand fast enough to keep up with the rising demand for EV batteries. According to a Bank of America study, the mining industry needs to increase capital expenditure to US\$160bn a year for the world to hit the goal of net-zero emissions by 2050. Over the past decade, capex has averaged only US\$99.5bn a year. Supply gaps are already being felt for commodities such as lithium and rare earths, forcing some battery-makers to reconsider their investment plans. LG, for example, is re-assessing its US\$1.3 bn investment in Arizona in the US.

Environmentalists and indigenous communities are also blocking the expansion of some critical minerals mining projects in both Europe and the US. Examples include Rio Tinto's stalled Jadar mine in Serbia, which aims to be Europe's largest lithium mine. A proposed new EU-wide mining code, which aims to encourage sustainable mining, is also causing consternation. Mining companies are worried it may impose even more restrictions, while environmentalists are concerned that it may open up more mining locations.

Mineral processing capacity poses another challenge

Low mining investment is not the only supply problem, with Europe and the US also over-reliant on China to process key minerals and metals for EV batteries. According to Benchmark Intelligence, China accounts for over half of the world processing capacity for critical supplies (see chart). It also accounts for 61% and 83% of the world's cathode and anode production.

By contrast, Europe has just a few upcoming lithium refining projects—one in Portugal and another one in Germany. RockTech (Canada) is also building a battery-grade lithium hydroxide plant in Germany and Romania (to be operational by 2024 and 2029, respectively), and has plans to build three more such plants in Europe. However, there are no plans to expand Europe's processing capacity for graphite or cobalt. As for nickel, Europe's refining capacity is owned by Russia's Nornickel. Although the risk of sanctions on Russian nickel is low, trade remains hampered.



BASF is one company that will be struggling for nickel supplies given the current geopolitical environment. The German company aims to account for nearly 20% of Europe's battery cathode production capacity by 2025. Although BASF does have existing agreements with Nornickel, it will be forced to diversify its nickel and cobalt supply in future. For nickel, BASF will look to Indonesia, but will need to compete with Chinese investors there. Cobalt often comes from the Democratic Republic of the Congo, again dominated by China. As a result, BASF as well as other European companies will have difficulty avoiding Russian and Chinese metal supplies.

Compared to Europe, North America has a better pipeline of new processing facilities. Canadian firm First Cobalt is in the process of planning the set up of North America's first cobalt processing plant in Ontario, Canada. Piedmont Lithium, a US miner has plans to set up a lithium processing plant in Tennessee, due to start operations in 2025. Albemarle has plans to set up a lithium refining plant as well. Tesla may open a lithium processing plant in Texas by 2024, if it gets a permit.

Europe and US supplies may be more expensive

However, processing critical minerals for battery use will be much more expensive in both the US and Europe than in China, where labour is cheaper. Additionally, Chinese investors have been seeking out other cheap processing locations.

In September 2022, for example, Zimbabwe permitted a group of Chinese investors to build a metals industrial park capable of processing lithium, platinum and nickel. Europe's energy crisis poses yet another challenge, raising costs and making it harder to attract new investment. Unless their investors manage to secure firm supply deals, the dozens of new EV battery plants in the EU or US run the risk of operating at low capacity or even being shut down.

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