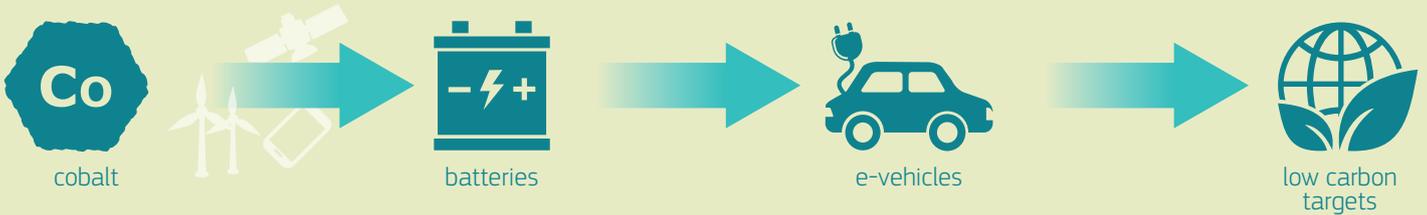


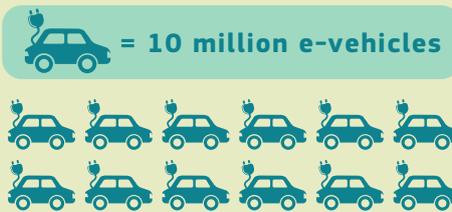
Cobalt: supply and demand balances in the transition to electric mobility

Why is cobalt important?



Why is cobalt potentially an issue?

65% of the cobalt demand in 2030 is needed for the e-vehicle market



55% of the world supply is coming from Democratic Republic of the Congo

Will cobalt demand exceed supply?



so even if EV battery recycling, mining and substitution are developed as assumed in the forecasts, the future supply-demand gap will unlikely be avoided



the price per tonne has escalated rapidly

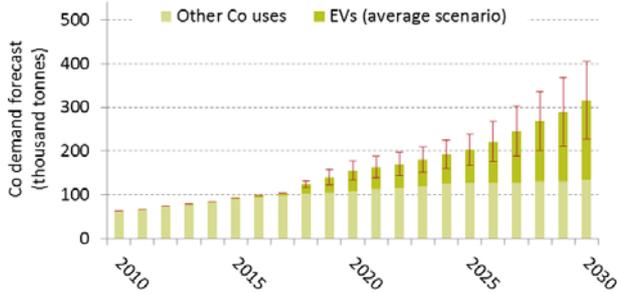


48% of the EU imports are coming from Democratic Republic of the Congo

The gap between supply and demand is widening, while battery manufacturing capabilities are set to grow. This emphasizes the importance of frameworks such as the Raw Materials Initiative.

Cobalt supply and demand in the transition to electric mobility*

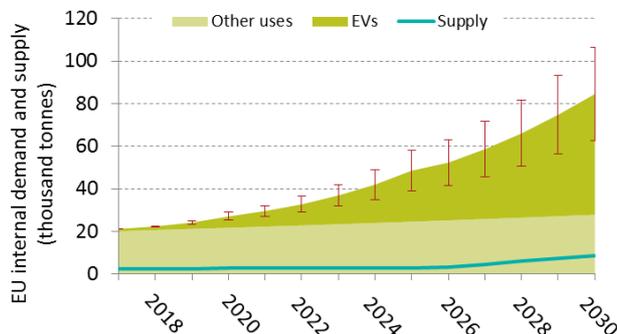
Road transport is undergoing a radical transformation with the switch from conventional to electric vehicles (EVs): as many as 130 million electric cars are expected to circulate worldwide in 2030, compared to 3.2 million in 2017. As a result, the worldwide demand for cobalt (a crucial element for the most common types of lithium-ion batteries used in EVs) could potentially increase threefold within the next decade, even assuming the future adoption of low-cobalt chemistries in EV-battery manufacturing.



While supply will be meeting demand until 2025, projections show shortages beyond this point in time. Cobalt prices have already tripled between 2016 and 2018 and, since they account for a significant part of the battery production costs, a further escalation might also impact EV prices. Substituting cobalt with other metals is technically possible and could reduce the 2030 EV market demand by 29 %; however, this will not be enough to fill the demand-supply gap alone.



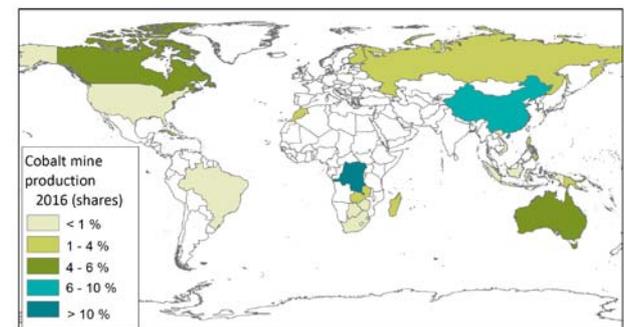
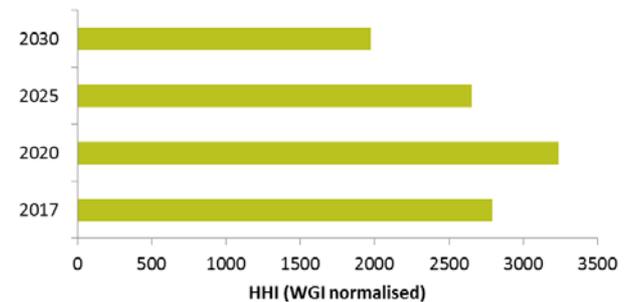
In the EU, the yearly cobalt demand is already about nine times larger than the internal supply. The gap is expected to increase in the next decade, and the EU will continue to heavily depend on imports for the foreseeable future.



This is a global issue, as the supply chain of cobalt faces concentration and significant risks of disruption. The majority (55 %) of the world supply is mined in the Democratic Republic of Congo, where unethical practices such as child

labour have also been identified. China, on the other hand, accounts for almost half of the world's refined cobalt production.

The concentration of supply and risks of disruption – estimated using the Herfindahl Hirschman Index (HHI) normalised by the scaled World Governance Indicators (WGI) – will persist in the future, increasing in the near term but potentially decreasing between 2020 and 2030, when currently ongoing exploration projects will add new suppliers and diversify the market. Australia is expected to become an important cobalt-producing country, potentially accounting for 14 % of the world production in 2030. As for the EU, battery recycling and additional mining activities could increase endogenous supply, which could then cover about 15 % of the European electric-vehicle sector demand in 2030.



As the EU further develops its battery manufacturing capacity, in the framework of initiatives such as the European Battery Alliance, it is crucial to secure adequate cobalt supplies and ensure that they are obtained sustainably. Some specific actions which could improve the cobalt supply stability in the future are:

- promoting domestic cobalt extraction and attracting private investments towards minerals exploration by improving the regulatory conditions;
- consolidating trade agreements with countries such as Australia and Canada, whose importance as cobalt producers is expected to increase in the future;
- ensuring that used batteries, including those from plug-in hybrid electric vehicles, are collected efficiently in order to boost cobalt recycling;
- exploring ways to bring low-cobalt battery chemistries and cobalt-free alternative technologies to the mass-scale market;
- monitoring the supply-and-demand situation of metals which could potentially substitute cobalt (e.g. nickel).

* This factsheet is based on the JRC Science for Policy Report: Alves Dias P., Blagoeva D., Pavel C., Arvanitidis N., *Cobalt: demand-supply balances in the transition to electric mobility*, EUR 29381 EN, Publications Office of the European Union, Luxembourg, 2018, doi:10.2760/97710.