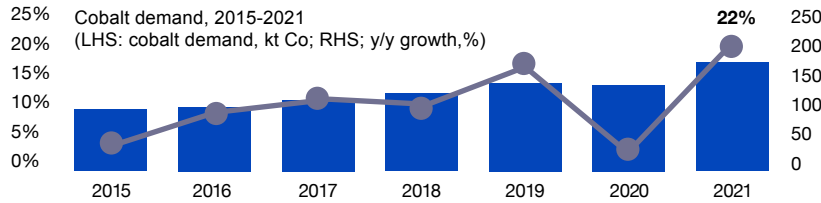


Cobalt Market Report 2021

Electric Vehicles Become the Major Driving Force for Cobalt Demand Growth in 2021

Cobalt market showed unprecedented demand growth

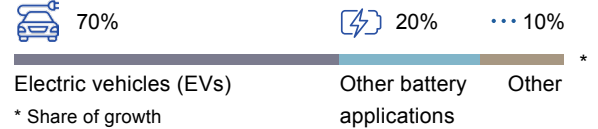
2021 alone saw 31.6 kt of demand growth compared to 50.8 kt in 5 years from 2015-20.



Demand rose by 22% (31.6 kt) y/y, reaching 175 kt in 2021

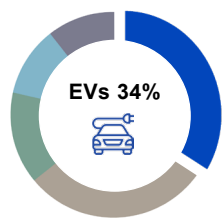
↑ Covid-19 recovery ⚡ Rapid growth of Lithium-ion battery market

Demand forecast: 317 kt by 2026



For the first time, electric vehicles became cobalt's largest end use sector

Electric vehicles (EVs) were the largest end use sector in 2021 and have the most growth potential.



- 34% EVs
- 31% Other battery applications
- 14% Industrial metals
- 11% Industrial chemicals
- 11% Superalloys

↑ 102% y/y increase in EV sales:



64% China



26% Europe



10% North America

🛒 Units sold globally



Half of global sales in China



EVs expected to account for half of cobalt demand in 2026

Cobalt-containing battery chemistries accounted for 74% of the global electric vehicle battery market

Europe

Top 10 NEV models	Cathode chemistry
Tesla Model 3	NCA & LFP
Renault Zoe	NMC 721
VW ID.3	NMC 721
VW ID.4	NMC 721
Kia eNiro	NMC 622
Ford Kuga PHEV	NMC 532
Fiat 500 Electric	NMC 622
Skoda Enyaq iV	NMC 721
Hyundai Kona Electric	NMC 622 / NCMA
Volvo XC40 PHEV	NMC 532



USA

Top 10 NEV models	Cathode chemistry
Tesla Model Y	NCA & NCMA
Tesla Model 3	NCA & LFP
Mustang Mach-E	NMC 811
Chevy Bolt	NMC 721
VW ID.4	NMC 721
Nissan Leaf	NMC 532
Audi E-tron	NMC 622
Porsche Taycan	NMC 622
Tesla Model S	NCA
Hyundai Kona Electric	NMC 622 / NCMA



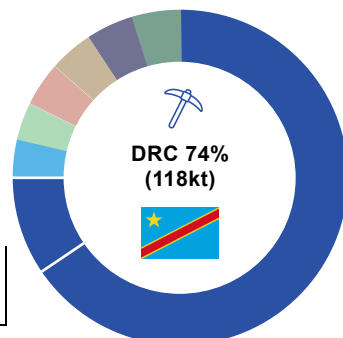
China

Top 10 NEV models	Cathode chemistry
Hongguang mini EV	LFP & NMC
BYD Qin EV	LFP
Tesla China Model Y	LFP, NMC811, NCMA
Tesla China Model 3	LFP, NMC811, NCMA
BYD Han EV	LFP
BYD Song Plus	LFP
LiXiang One	NMC
Cherry eQ	LFP & NMC
CCAG Benben EV	LFP
GAC Aion S	NMC



Mined supply remains dominated by the DRC

- 74% DRC (118kt)
- 3% Australia (5.6kt)
- Cuba (4.9 kt)
- Philippines (4.3 kt)
- 13% Russia (4.0 kt)
- Canada (3.7 kt)
- PNG (3.1 kt)



Artisanal & small-scale mining (ASM) accounted for 12% (14.5 kt) of DRC mined supply in 2021

Other market trends in 2021



China provided 71% of global refined supply growth
It is also the largest cobalt refiner — 72% of total primary production, 104 kt in 2021.



Indonesia is the largest growth market for refined cobalt production after China.
It is expected to provide ¼ of total refined and 32% of refined chemical growth.



Supply chain bottlenecks create disconnection between the DRC's production and exports to China in 2021.



Cobalt metal prices doubled in 2021
\$16/lb — January → \$32/lb — December