



## expected ROI of nickel manganese cobalt battery project in Luxembourg 2

Will lithium & cobalt produce more manganese in ?The quantities of material demand for manganese used in LIBs are low in contrast to the high global production volume. However, the calculation for lithium and cobalt predicts a higher material demand in than the production volume of these battery metals in . In the case of nickel, it depends on the technology and growth scenario. Will NMC dominate the battery market in ?The high nickel content improves the capacity of the materials and, for instance, increases that of an NMC 811 by almost 50% compared to NMC 111 to about 200 mAh/g (Research Interfaces ). It is predicted that NMC with various compositions will dominate 75% of the battery market in (Zhao ).

### 3.2.1. Medium-Ni materials

Will battery chemistry reduce cobalt reliance?Although battery chemistry is evolving to reduce cobalt reliance, McKinsey forecasts a 7.5% annual increase in absolute cobalt demand until . This growth highlights issues around sourcing transparency and price volatility, with companies prioritising ethical and sustainable practices in response. Should EV libs be changed from cobalt-rich to nickel-rich cathode materials?Therefore, it should be considered to change the cathode materials from cobalt-rich towards nickel-rich and Fe- and Mn-based cathode materials. The transition to other cell chemistries like Fe- and Mn-based materials can significantly reduce the pressure on Co and Ni demand. This would result in lower raw material use for EV LIBs. Can manganese replace cobalt?A theoretically abundant and lower cost raw material, manganese can partially replace cobalt or nickel in certain chemistries like LMR-NMC or NMCA, and can improve the driving range of LFP batteries (the so-called LMFP batteries). What is the GWP impact of NMC and LFP batteries?Majeau-Bettez et al. found the overall GWP impact of the production of 1 kWh of NMC and LFP batteries, considering an average European electricity mix, in a range of 200-250 kg CO<sub>2</sub> eq. McKinsey: Is the Battery Supply Sustainable?By , this figure is projected to increase to 95%. Innovations such as direct lithium extraction are progressing, yet demand continues to outpace supply, underscoring the Analyzing the global warming potential of the production and The paper presents a cradle-to-gate (CTG) life cycle assessment (LCA) of nickel-manganese-cobalt (NMC) chemistries for battery electric vehicle (BEV) applications. Battery recycling reportEnd-of-Life batteries and scrap from battery gigafactories in Europe have potential to provide 14% of all lithium, 16% of nickel, 17% of manganese, and a quarter of cobalt demand by already. What Impact are EVs and Renewables Having on Raw Materials?With only modest increases in HPMSM production projected and a fraction of demand expected to be met by , this highlights significant supply challenges ahead. McKinsey: EV Growth Tests Raw Material Supply ChainsA McKinsey report warns that base-case supply may fall short of demand, leading to shortages, price fluctuations and substantial investment requirements. Here, we explore the Nickel Manganese Cobalt (NMC) Battery Market Forecasts to According to Statistics MRC, the Global Nickel Manganese Cobalt (NMC) Battery Market is accounted for \$25.8 billion in and is expected to reach \$81.7 billion by McKinsey: How Sustainable is the Battery Supply?Here, Scope 3 Magazine takes a closer look at key materials including lithium, nickel, cobalt and manganese as McKinsey reveals the complexities of ensuring a sustainable A forecast on future raw material



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demand and recycling potential This study focuses on the future demand for electric vehicle battery cathode raw materials lithium, cobalt, nickel, and manganese by considering different technology and What Impact are EVs and Renewables Having on Raw Materials?The Democratic Republic of Congo (DRC) produces 64% of the global cobalt output, largely as a by-product from copper and nickel mining. Despite the decreasing role of McKinsey: Supply shortage looms for critical battery Based on the current market, battery manufacturers can expect challenges securing the supply of several essential battery raw materials such as lithium, high-grade nickel, cobalt and manganese. Commission selects 47 strategic projects to secure access to raw Notably, multiple initiatives focus on lithium (22), nickel (12), cobalt (10), manganese (7), and graphite (11), strengthening the EU battery value chain. With these efforts, Battery : Resilient, sustainable, and circular Battery : Resilient, sustainable, and circular Battery demand is growing--and so is the need for better solutions along the value chain. Supply-demand imbalance looms for critical battery While the share of cobalt in battery chemistry mix is expected to decrease, the absolute demand for cobalt for all applications could rise by 7.5% a year from and , McKinsey estimates Cobalt: demand-supply balances in the transition to PDF | On Jan 1, , Alves Dias and others published Cobalt: demand-supply balances in the transition to electric mobility | Find, read and cite all the research you need on ResearchGate McKinsey: Is the Battery Supply Sustainable?McKinsey reveals battery raw material outlook on lithium, nickel and cobalt as demand for these materials may soon outstrip base-case supply The electrification of Supply-demand imbalance looms for critical battery While the share of cobalt in battery chemistry mix is expected to decrease, the absolute demand for cobalt for all applications could rise by 7.5% a year from and , McKinsey estimates, adding that shortages of

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