Nickel-cobalt-aluminum batteries nca abkhazia

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a Cumulative global cobalt cycle, b cumulative cobalt apparent consumption (inflows to manufacturing) by sector by region, c cumulative net import (positive values) and net export (negative values) of cobalt-containing final products by sector by region, d cumulative demand (inflows to in-use stocks) by sector by region, and e in-use stocks by end use by region in 2019. All values are in metric kilotons as cobalt metallic equivalent.

Recycling cobalt as a secondary supply would be an essential way to supplement to primary supply. It would gradually become the major source of cobalt supply as more cobalt-containing products reach their EoL. The increase in the EoL recycling rate for cobalt-containing products would improve the secondary supply by 3680 kt in total from 2020 to 2050 in the S6 scenario. Under the S4 and S7 scenarios, the secondary cobalt supply could exceed the total demand after 2044 and 2043, respectively, indicating a closure of the cobalt cycle in the long run through recycling only.

a S1: state-of-the-art battery cathode technology scenario as the reference scenario; b S2: low-cobalt battery cathode technology scenario; c S3: LFP-dominant cobalt-free battery cathode technology scenario; d S4: next-generation cobalt-free battery cathode technology scenario; e S5: extending battery lifetime scenario; f S6: high recycling rate scenario; and g S7: the most optimistic technology scenario. The scenarios are detailed in Table 2 in the Methods section. The primary-base and primary-high indicate two primary supply scenarios, as shown in Table 1 and Methods.

In addition to the abovementioned critical influencing factors, EV market shares and vehicle ownership are the other two key parameters affecting the prospective cobalt demand of power batteries. The sensitivity analysis results of global cobalt demand in total and by end-use sector for all key parameters are shown in Supplementary Figs. 30-39.

Although the cobalt demand for Japan is much lower than that for other regions, the limited domestic cobalt reserves and overseas reserve ownership lead to a relatively higher supply risk in Japan. In this regard, Japan"s ambition to build a "hydrogen society", which signifies a preference for fuel cell vehicles (cobalt-free vehicles) in the transportation system instead of BEVs and PHEVs, could significantly reduce the country"s dependency on cobalt and mitigate potential supply shortages to some extent.

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