FACT SHEET INDONESIA

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Electrifying road transport with less mining: A global and regional battery material outlook

As part of efforts to improve air quality and implement commitments to reduce greenhouse gases, the Indonesian government has set targets for increased adoption of battery electric vehicles (BEVs), aiming for 2 million electric passenger cars and 13 million electric two- and three-wheelers in the vehicle stock by 2030. Reaching these targets entails a rapid increase in demand for BEV batteries—and the materials used to produce them.

A new ICCT study projects the demand for battery cells and raw materials for BEVs and plug-in hybrid electric vehicles (resulting from adopted and announced policies and targets in Indonesia and globally. This projected demand is compared with announced cell production and mineral supply capacities. The study evaluates all segments of road transport, including two- and three-wheelers, passenger cars, and heavy-duty vehicles. In a second step, this analysis explores how the development of an efficient battery recycling ecosystem, a reduction in the average battery size of electric passenger cars, and a reduction in vehicle sales through transport demand avoidance and modal shift strategies could reduce the demand for raw materials in Indonesia while maintaining a rate of vehicle electrification aligned with announced policies and targets.

On a global level, this study finds that total announced cell production capacity exceeds 2030 demand by almost a factor of two. Likewise for the supply chains of key battery materials, the scaling-up of global battery mining capacities is projected to keep pace with growing demand. In the long term, this study finds that global mineral reserves are sufficient to meet battery demand. Even for the Baseline scenario in which battery demand through 2050 is met only with lithium-ion battery technologies already commercialized in 2024, cumulative material demand would correspond to less than half of currently explored land-based lithium, cobalt, and nickel reserves.

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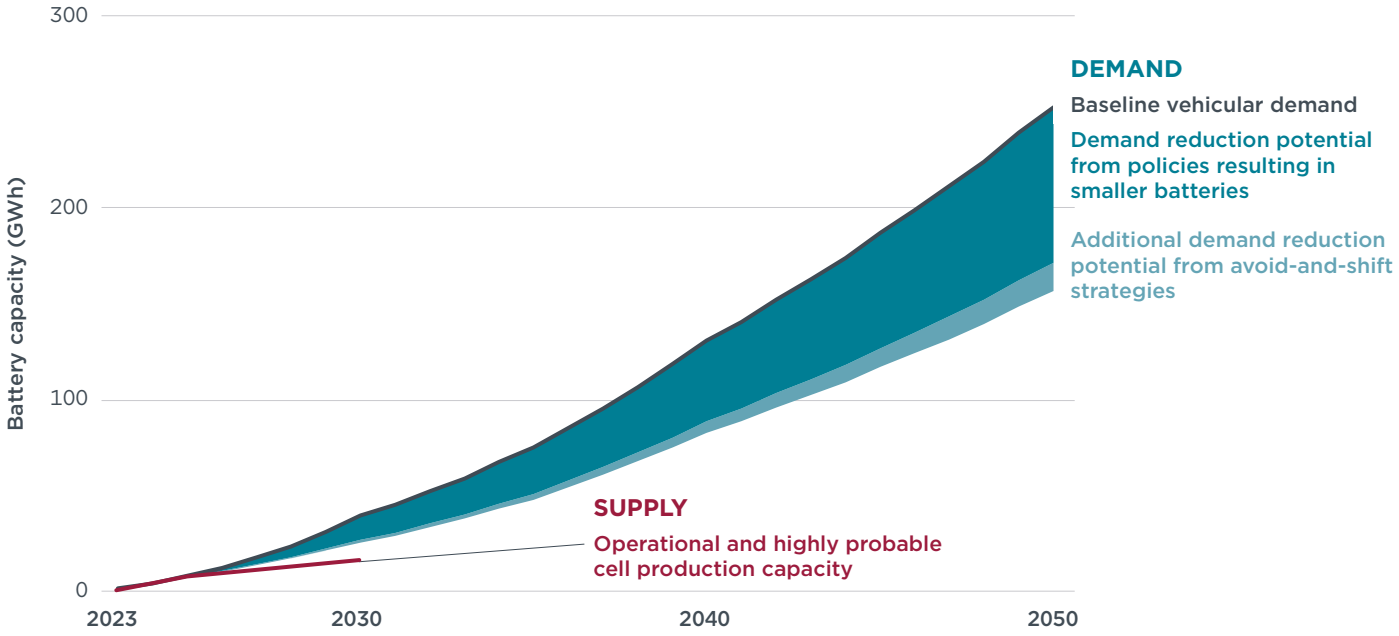
Key results for Indonesia include:

Announced battery cell production capacities in Indonesia are growing, but do not yet meet the 2030 demand associated with transport electrification targets. As displayed in Figure 1, announced domestic battery cell production capacities in Indonesia as of July 2024 would make up 44% of the 2030 demand resulting from Indonesia's BEV sales share targets. These findings indicate that more investments and policy support would be needed to fully meet Indonesia's future battery demand from domestic production; alternatively, remaining battery demand could be met through imports.

Figure 1

Battery demand in Indonesia by policy scenario compared with announced cell production capacity



Notes: This demand projection excludes lead-acid batteries. Cell supply data are sourced from Benchmark Minerals Intelligence.

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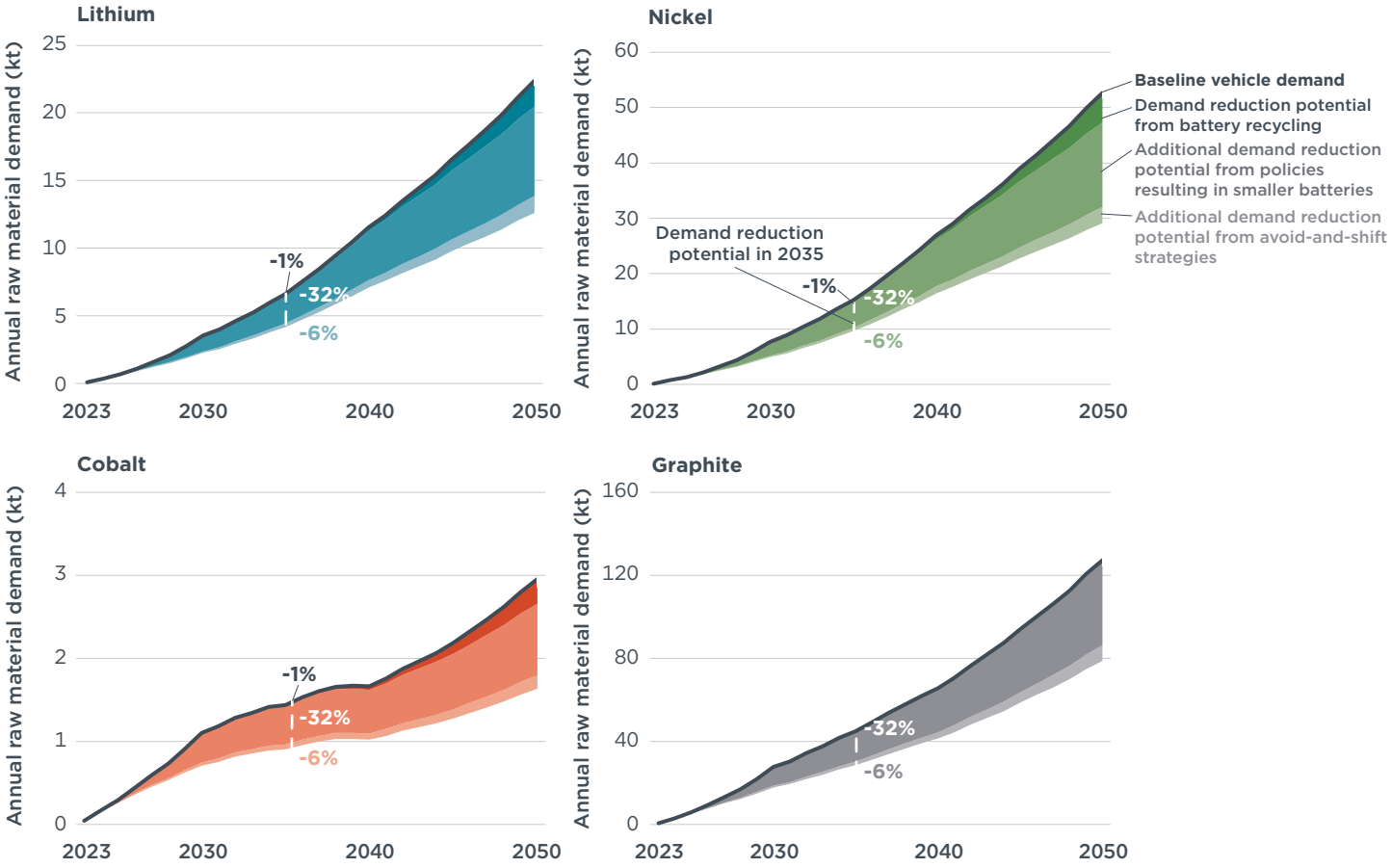
Material demand in Indonesia is impacted by the development of battery technology market shares. Figure 2 presents how the projected battery demand in Indonesia under a Baseline battery technology mix scenario translates to an increase in raw material demand for lithium, nickel, cobalt, and graphite in the country. The report further explores scenarios in which a higher share of LFP batteries would reduce nickel and cobalt demand, while a higher share of lithium nickel manganese cobalt oxide (NMC) batteries would increase it.

Smaller average battery sizes, especially for passenger car BEVs, are found to be the most immediate way of reducing battery and, thus, raw material demand. Implementing policies to right-size passenger car BEV batteries could reduce the annual battery demand in Indonesia by 32% in both 2035 and 2050. Demand for lithium, nickel, cobalt, manganese, and graphite would decrease by the same amounts in both years.

Figure 2

Annual raw material demand for lithium, nickel, cobalt, and graphite in Indonesia under the Baseline and demand reduction scenario



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Battery recycling and reduced vehicle sales as a result of a less vehicle-dependent transportation system can reduce battery and raw material demand, with impacts growing significantly after 2040. The development of a battery recycling ecosystem with comprehensive collection of end-of-life vehicles and high element-specific recovery rates in Indonesia would create a domestic source of secondary mineral supply amounting to 9%–10% of lithium, nickel, and cobalt demand for BEVs in 2050, depending on the mineral. A change in vehicle sales due to transport demand avoidance and modal shift policies could reduce battery and mineral demand from road transport by 6% in 2035 and by 9% in 2050.

Indonesia's nickel and cobalt reserves hold large economic potential for export, while the country relies on international supply chains for other materials. The cumulative domestic demand for nickel and cobalt for vehicle electrification between 2023 and 2050 would require about 1% and 8% of Indonesia's nickel and cobalt reserves, respectively. This finding highlights the ample economic opportunity for Indonesia to develop nickel and cobalt mining and refining capacities for the global market. For other materials, including lithium and graphite, Indonesia is likely to rely on imports from other mineral-rich countries.

POLICY RECOMMENDATIONS

The findings of this analysis underscore that global battery manufacturing and mineral supply chains are not limiting the implementation of vehicle electrification targets in Indonesia. Further, a growing number of announced cell production capacities in Indonesia and vast reserves of some of the key minerals involved in the transition to electric vehicles position Indonesia to meet an increasing share of its material demand with domestic supply.

Establishing clear transport electrification policies, incentives for domestic supply chain activities, and trade agreements with resource-producing countries could help to expand battery production capacities and secure mineral supply chains. Specific policies include:

- Setting targets for electric vehicle production, exports, and national sales shares sends signals to the industry to invest in supply chain projects.
- Providing administrative and financial support for mineral mining and processing projects can help to develop domestic battery supply chains.
- Establishing strategic partnerships with other mineral-producing countries to secure a supply of materials not covered by domestic reserves, such as lithium and natural graphite.

Policies that reduce the average battery sizes of battery electric passenger cars can curb the demand for raw material mining in the near term, while battery recycling and avoid-and-shift strategies can realize reductions in the long term. These include:

- Measures such as improving BEV energy efficiency and promoting battery right-sizing can support a shift to vehicles with smaller batteries. In addition to reducing the demand for raw material mining, these policies also translate to consumer benefits of more affordable BEVs with lower operational costs.
- Expanding existing battery recycling policies to ensure a complete collection of end-of-life vehicles prevent batteries from becoming electronic waste. Setting mandatory mineral recovery rates for battery recycling can further spur the development of a domestic battery recycling industry and secondary mineral supply.
- Implementing transport avoidance and modal shift strategies such as transport demand management programs, expanding public transport capacities, and building out safe walking and biking infrastructure.

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