

Balancing Act: Navigating Indonesia's Nickel Industry Strategic Development Amid Decarbonisation Efforts

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ABSTRACT

Indonesia, a global powerhouse in the nickel industry, aims to become a leading supplier of raw materials for electric vehicle (EV) batteries by leveraging its abundant natural resources. With over 20% of the world's nickel reserves and 35% of global production, Indonesia aims to rank among the top three EV battery producers by 2027. Recent government restrictions on low-grade nickel exports have spurred domestic refining capacity and higher value-added exports. However, this growth, supported by local coal-fired captive power plants, leads to increased greenhouse gas (GHG) emissions, challenging Indonesia's net-zero goals and the sustainability of the global battery supply chain.

Key nickel processing routes in Indonesia include the pyrometallurgical rotary kiln electric furnace (RKEF) and the emerging high-pressure acid leaching technology (HPAL). The RKEF process refines saprolite ores into ferronickel for stainless steel feedstock, while HPAL targets low-grade limonite ores to produce high-purity nickel for EV batteries. This process has recently been deployed in Indonesia and offers a cost competitive advantage to produce high grade nickel. Both processes rely heavily on fossil fuels, contributing to significant CO₂ emissions.

This study explores solutions to decarbonise the nickel industry and presents a regulatory roadmap for implementation. It showcases two conceptual cases: a brownfield RKEF plant and a greenfield HPAL, illustrating the role of technology in decarbonising nickel processing routes. The study also highlights the emissions intensity of Indonesia's burgeoning nickel refining industry, emphasising the risk of losing competitiveness due to environmental concerns if Indonesia continues to produce nickel with a high carbon footprint, as EV customers are increasingly seeking sustainable raw materials. This research is relevant not only to Indonesia but also to countries where the nickel industry faces environmental, technical, and commercial challenges.