

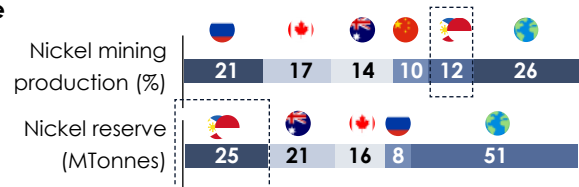
ASEAN has world-leading nickel reserves and is focusing on downstreaming the nickel industry

1 Nickel will be an important mineral for energy transition. Low-carbon technologies, especially batteries that use CAM technology, need Grade I Nickel¹

| Low-carbon technology | Nickel |
|-------------------------|--------|
| Utility-scale batteries | ● |
| EV batteries | ● |
| EV charges | ● |
| Solar PV | ● |
| Wind | ● |

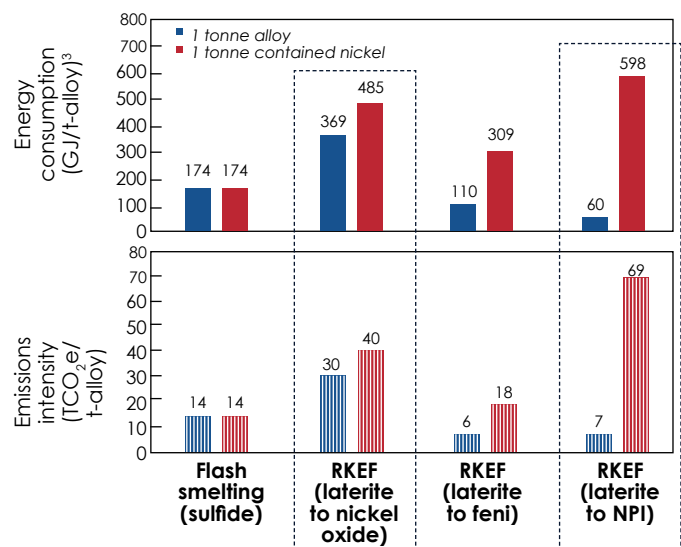
● High ● Moderate ● Low

2 Indonesia and the Philippines are key producers of nickel. These two countries have ~10% of nickel mining and possess ~20% of global reserve.² **~\$50bn has been invested** on nickel value chain in ASEAN over the **past five years**



Other than high-pressure acid leaching method, existing nickel production is energy intensive, due to high electricity and heat consumption

1 Current Grade I nickel processing in Indonesia is very energy and emissions intensive. Rotary Kiln Electric Furnace (RKEF) and Nickel-pig Iron (NPI) method, both of which are emissions intensive due to reliance on coal, are main methods for production.



Using projected nickel production routes, mandating **renewables use in nickel-related industrial parks** can create **~1.7 to 2.8 GW demand for low-carbon solutions for power⁴, depending on scenario.**



With the right timing, Indonesia can further **unlock enabling conditions for power and medium-to-high industrial heat, creating a cascading effect** into the low-carbon solution ecosystem.



Achieving low-carbon nickel production will also attract new markets, thus adding the potential of **establishing green corridors to battery production regions** (e.g., EU), creating **cascading effect to the shipping sector.**

Integrating Vre in nickel processing can create up to 2.8 gw demand of vre solutions

Notes: 1) IFC (2022), Net Zero Roadmap for Copper and Nickel; 2) McKinsey (2020), How clean can the nickel industry become? and BloombergNEF; 3) Wei et al (2020), Energy Consumption and Greenhouse Gas Emissions of Nickel Products; 4) Systemiq analysis using assumptions: Class I nickel production achieved through 50% RKEF-NiO and 25% RKEF-FeNi, at 23 MWh/tonne Ni. See Appendix A for more details.