

Is nickel mining a sustainable resource?

Global nickel demand is projected to double by 2050 to support low-carbon technologies and renewable energy production. However, biomass carbon emissions from clearing vegetation for nickel mining are rarely included in corporate sustainability reports or considered in mineral sourcing decisions.

How does low-cost production affect nickel supply?

In this perspective, we discuss nickel supply where abundant low-cost production coincides with unsustainable practices and reinforces low prices. Low prices discourage investing in clean energy integration or low-impact technologies in mining and processing operations.

How can a Responsible Investment contribute to sustainable nickel production?

Responsible investment can complement just-transition-led economic development in resource-rich nations and translate discerned demand into sustainable nickel capacity, provided public policy and institutions drive political will for coordinated, climate-aligned strategies.

What is the future demand for nickel?

Climate action, among other factors, is projected to see future nickel demand from energy technologies soar to 2.27 Mt of nickel per year by 2050⁹. A recent analysis by the International Energy Agency predicts that cleantech demand for nickel will increase from 0.48 Mt (in 2023) to 3.4 Mt by 2040¹¹.

What is nickel used for?

Today, nickel is primarily used in stainless steel and other alloys, as well as in specialized corrosion-resistant plating^{10,11}. Nickel is also used to produce numerous low-carbon energy production and storage technologies, including batteries and infrastructure for geothermal, wind, solar photovoltaic, hydroelectric, and nuclear energy.

Why is Ni a critical metal?

Increasing demand for Ni in the clean energy transition has identified Ni as a critical metal. Ni provides high storage capacity, which reduces the size of lithium ion-batteries. High-grade Ni laterites and sulfide deposits are depleting due to intensive production and overconsumption.

Nickel plays a crucial role in the production of various renewable energy technologies, particularly in the development of batteries that store renewable energy and ...

Nickel's most important role, however, is expected to be in battery production. It enhances battery performance by increasing energy density, which supports higher voltages ...

We evaluate the impact on nickel demand of future power generation requirements under Wood Mackenzie's two accelerated energy transition scenarios. The nickel story is one ...

We focus on global nickel supply and outline the nickel industry's challenges in aligning economic incentives and socio-ecological impacts as it responds to growing demand. ...

Study on electrolyte supply strategy for energy storage system of multi zinc nickel single flow battery stack loaded with single pump. Shouguang Yao, Xiaofei Sun, Xiaoxu Yang, Rui Zhou, ...

Lithium-ion batteries, LIBs are ubiquitous through mobile phones, tablets, laptop computers and many other consumer electronic devices. Their increasi...

The world is rapidly adopting renewable energy alternatives at a remarkable rate to address the ever-increasing environmental crisis of CO₂ emissions....

As summarized in Table 1, cathode materials with high nickel content, ... Impact of shared battery energy storage systems on photovoltaic self-consumption and electricity bills in ...

This review summarizes the state-of-the-art of Ni-based cathode for LIBs through high-impact scientific references. ... Although LIBs are a promising storage energy system, ...

This study highlights the importance of Ni substitution to control the physicochemical properties of spinel-phase CuFe₂O₄ for diverse applications, such as ...

Fig. 1 shows the forecast of global cumulative energy storage installations in various countries which illustrates that the need for energy storage devices (ESDs) is ...

Environmental impact; Ni-MH (established) Nickel not green (difficult extraction/unsustainable), toxic. Not rare but limited: Recyclable: Pb-A (established) ... Battery ...

The demands for ever-increasing efficiency of energy storage systems has led to ongoing research towards emerging materials to enhance their properties [22]; the major ...

Impact of Nickel substitution on structural, dielectric, magnetic, and electrochemical properties of copper ferrite nanostructures for energy storage Journal of ...

In particular, nanostructured nickel molybdate (NiMoO₄) is a promising entrant as an electrode substance for sophisticated power bank applications, apart from being a catalyst for chemical ...

However, nickel is less stable than other materials with respect to cycle life, thermal stability, and safety. Researchers from The University of Texas at Austin and Argonne ...

CoFe₂O₄ and NiFe₂O₄ are known as inverse spinel structures, with the tetrahedral A sites occupied by

half of the Fe 3+ cations. In contrast, the B sites are shared by ...

Lithium-ion batteries (LIBs) deployed in battery energy storage systems (BESS) can reduce the carbon intensity of the electricity-generating sector and improve environmental sustainability.

Revisiting the impact of Co at high voltage for advanced nickel-rich cathode Energy Storage Materials (IF 18.9) Pub Date : 2024-02-29, DOI: 10.1016/j.ensm.2024.103311

Increasing demand for Ni in the clean energy transition has identified Ni as a critical metal. Ni provides high storage capacity, which reduces the size of lithium ion-batteries. High ...

Given its pivotal role in the renewable energy revolution, nickel is not merely a metal but an indispensable catalyst in clean technologies, bolstering the deployment of various ...

By harnessing natural processes and phenomena, renewable energy sources reduce the environmental impact of fossil fuels, such as solar, wind, hydroelectricity, and ...

Electricity appears to be the most appropriate energy vector for successfully carrying out the ecological and energy transitions, which have been underway for several ...

Electrochemical performance evaluations through cyclic voltammetry (CV) and chronopotentiometry (CP) revealed that the twentieth discharge capacity of Co-Ni(TPA) (4000 ...

Given its pivotal role in the renewable energy revolution, nickel is not merely a metal but an indispensable catalyst in clean technologies, bolstering the deployment of various sustainable solutions such as geothermal power, ...

Global nickel demand is projected to double by 2050 to support low-carbon technologies and renewable energy production. However, biomass carbon emissions from ...

The sodium/nickel chloride battery or ZEBRA (Zero Emission Battery Research Activities) battery (Parkhided, 2006) is an innovative energy storage system with applications ...

NMC811 battery chemistry was selected because nickel-rich layered oxide batteries are expected to be dominating the future market to address the urgent demand for energy ...

In the present work, to disclose the mechanism of Co element in nickel-rich ternary materials, two cathode materials of LiNi 0.8 Co 0.1 Mn 0.1 O 2 (NCM811) and LiNi 0.8 Co 0.15 ...

Nickel-rich NCM cathode materials have gradually become most promising materials for commercial power lithium-ion batteries due to their high specific capacity and ...

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