

NICKEL

AN ABUNDANT RESOURCE FOR THE FUTURE

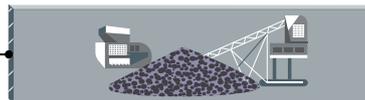
With a global population expected to rise to over 9 billion by 2050 and with the corresponding increase in urbanisation and environmental challenges, it is important to address the availability of natural resources such as nickel.

Current estimates indicate nickel is available to meet the needs for future generations. The discovery of new nickel deposits, as well as technical advances in mining and extraction, will increase the amount of available nickel. High nickel recycling rates ensure that existing nickel remains available for use by future generations.

MINED NICKEL

1.900.000 metric tons

Annual nickel mine production



APPLICATIONS

25.000.000 metric tons

Nickel in use today



RESERVES

100.000.000 metric tons

Proven nickel reserves worldwide



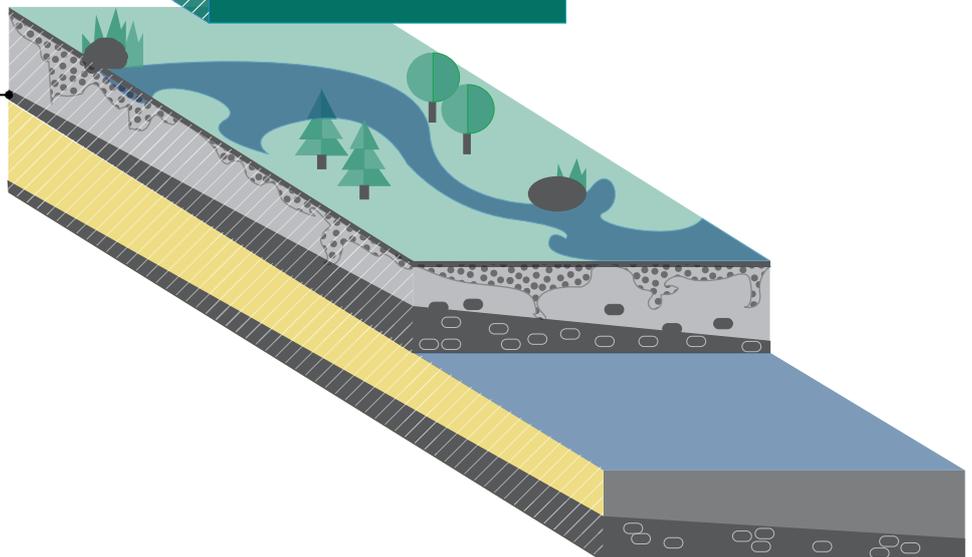
RESOURCES

199.000.000 metric tons

Potentially available nickel resources worldwide

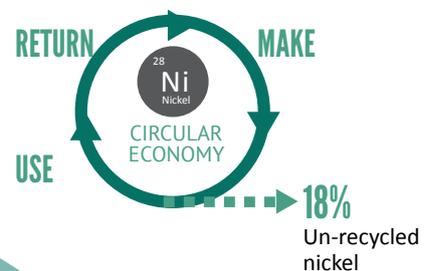
290.000.000 metric tons

Potentially available nickel offshore worldwide



FULLY RECYCLABLE

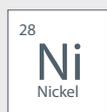
Nickel is a natural resource, which cannot be consumed. It is fully recyclable again and again without loss of quality, contributing to the Circular Economy (CE) model.



By 2050, providing enough food, water, housing, transport, and energy will require a concerted drive for new and improved technologies

IT WILL BE IMPOSSIBLE TO ADDRESS THESE NEEDS WITHOUT METALS SUCH AS NICKEL

The best-known properties of nickel - toughness, malleability and enhanced corrosion resistance - allow superior performance in difficult environments, at extremely high temperatures and in many everyday applications. These properties are why nickel-containing materials play such an important role in providing food, water, housing, transport and energy, and why they will continue to contribute to a sustainable economy and a healthy society.



Nickel is a naturally occurring, lustrous, silvery-white metallic element. **It is the fifth most common element on earth and occurs extensively in the Earth's crust.** Even if much of the nickel is currently inaccessible, technological developments in mining and extraction will make these resources accessible for future generations.



Nickel-containing materials like stainless steel, are fully recyclable without loss of quality. They also have the further advantage of being ideally suited for recycling because they have end-of-life value, are easily identified, and can be turned into new high quality materials with less energy. Nickel already has a high recycling rate which will only improve over time.

NICKEL IS AVAILABLE IN ABUNDANCE

- Reserve and resource data are estimates. They rely on exploration data from companies which usually only conservatively predict the next 10-20 years because of strict capital markets regulatory requirements
- Current resource estimates from respected sources indicate that nickel is available for more than 100 years
- The reserve situation over the past 20 years has remained unchanged although 32 million tonnes of primary nickel have been produced over that time.
- New nickel deposits are continuously discovered
- New and innovative mining and extraction technologies will lead to increased nickel production

NICKEL CANNOT BE CONSUMED BUT IS USED

- Generally, nickel is not consumed: nickel is used
- More than half of the nickel mined historically is still in society – nickel-containing materials have a long service life
- Nickel which is brought into society is not lost as a resource. It is available to future generations through recycling when its existing use reaches its end of life.

HIGH RECYCLING EFFICIENCIES OF NICKEL CONTRIBUTE TO CIRCULAR ECONOMY CONCEPTS

- Nickel is among the metals with the highest recycling efficiencies
- Most recycling takes place in the stainless steel sector
- The high recycling efficiencies are linked to the fact that nickel is infinitely recyclable and has a high economic value



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Sources:

British Geological Survey (2008) – *Nickel Commodity Profile* (<https://www.bgs.ac.uk/downloads/start.cfm?id=1411>)
Heinz H. Pariser, Alloy Metals & Steel, Market Research (2014) – *Nickel, a surface technology material*, INGS
Reck B. and Graedel T. (2012) – *Challenges in metals recycling*. Science 337, 690 (2012); DOI: 10.1126/science.1217501
Mudd and Jowitt (2014) – *A detailed assessment of global nickel resource trends and endowments*. In: Economic Geology v. 109 pp 1813-1841.

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