

Environmental Footprint Declaration

Aurubis Raw Nickel Sulfate



This document presents an environmental footprint declaration based on the results of a life cycle assessment (LCA) of Aurubis raw nickel sulfate, developed in accordance with ISO 14040 and ISO 14044 standards and the principles of ISO 14025. No applicable Product Category Rules (PCR) were available at the time of publication.

1. General information

Product name	Raw nickel sulfate
Declared unit	1 metric ton of nickel contained in raw nickel
Manufacturer	Aurubis
Production site(s)	Aurubis plants in Hamburg, Pirdop and Lünen
LCA	Aurubis supported by Sphera
Publication date	13/10/2025
Time coverage	Reference calendar year 2024
Independent verifier	TÜV NORD CERT Prüf- und Umweltgutachtergesellschaft mbH
Review type	Critical review per ISO 14044 (Clause 6)

2. Methodology and scope

Applied standards/guidelines: The study was conducted in accordance with the ISO 14040 (ISO 14040:2021 Environmental management — Life cycle assessment — Principles and framework) and ISO 14044 (ISO 14044:2021 Environmental management — Life cycle assessment — Requirements and guidelines) LCA standards and the Environmental Footprint impact assessment method (3.1).

Functional unit: 1 metric ton of nickel contained in raw nickel sulfate at plant gate.

System boundaries: Cradle-to-gate life cycle inventory from the extraction of raw materials to the production of nickel sulfate based on allocated profile of raw nickel sulfate from copper refining. Excludes packaging, downstream use, and end-of-life.

Allocation procedures: Economic allocation was applied at the copper electrolytic refining stage to account for nickel sulfate as a co-product in the copper cathode life cycle assessment.

3. Product

Product description: Aurubis raw nickel sulfate is a technical-grade product derived as a result of the treatment and purification of the spent electrolyte from copper electrolytic refining.

Technical properties/applications: Nickel sulfate offers excellent mechanical strength, corrosion resistance, electrical conductivity, and magnetism. These properties make it suitable for use in electroplating, battery production (especially for electric vehicles), and other advanced industrial applications requiring technical quality.

Expected service life: Dependent on downstream application; typically long-term use in batteries, electronics and industrial systems.

4. Environmental performance — impact results (per 1 metric ton nickel contained in nickel sulfate)

Impact category	Unit	Result
Climate change	kg CO ₂ eq	2,275
Ozone depletion	kg CFC-11 eq	0.00000002
Human toxicity, cancer effects ¹	CTUh	0.000001
Human toxicity, non-cancer effects ¹	CTUh	0.00004
Particulate matter	Disease incidences	0.0002
Ionizing radiation	kBq U235 eq	28.6
Photochemical ozone formation	kg NMVOC eq	10
Acidification	mol H+ eq	20.4
Eutrophication (terrestrial)	mol N eq	38.4
Eutrophication (freshwater)	kg P eq	0.006
Eutrophication (marine)	kg N eq	3.5
Ecotoxicity (freshwater) ¹	CTUe	11,115
Land use ¹	Pt	8,643
Water use	m ³ world eq	648
Resource use, energy carriers	MJ	21,782
Resource use, mineral and metals ¹	kg Sb eq	0.43

¹ Impacts are not sufficiently robust and accurate to be used for metals.

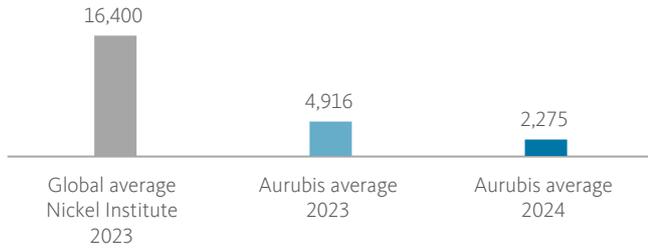
5. Environmental performance improvement and comparison with global average

The following graphs show the environmental improvements achieved by the company between 2023 and 2024 for raw nickel sulfate production.

They also compare the carbon footprint of Aurubis nickel sulfate to global average values. Global average data was sourced from the environmental profile of nickel sulfate hexahydrate (22 % Ni content) published by the Nickel Institute.

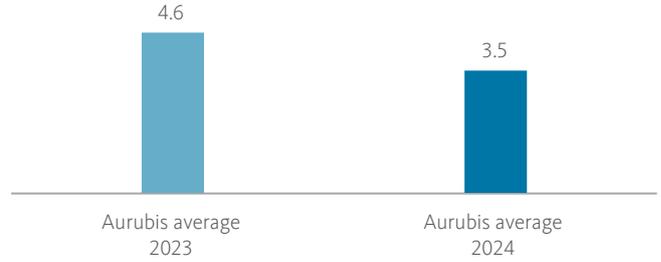
Carbon footprint

in kg CO₂ eq/t Ni in NiSO₄



Eutrophication, marine

in kg N eq/t Ni in NiSO₄



Resource use, fossils

in GJ/t Ni in NiSO₄



Eutrophication, terrestrial

in mole N eq/t Ni in NiSO₄



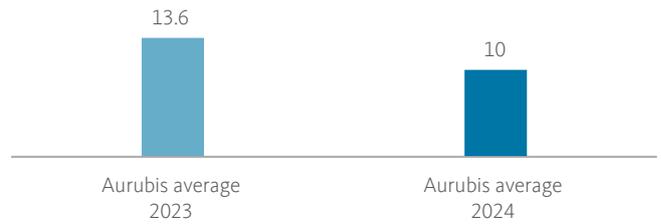
Acidification

in mole H⁺ eq/t Ni in NiSO₄



Summer smog

in kg NMVOC eq/t Ni in NiSO₄



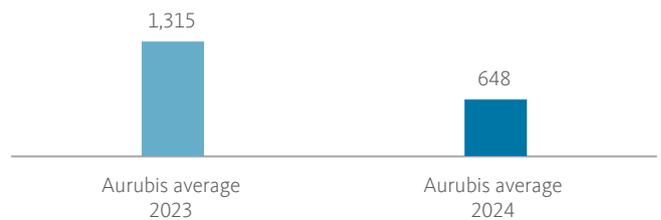
Eutrophication, freshwater

in kg P eq/t Ni in NiSO₄



Water use

in m³ world eq/t Ni in NiSO₄



6. Additional environmental information

Recycled content: The recycled content of the Aurubis product raw nickel sulfate for calendar year 2024 was 48 %. The recycled content has been verified by TÜV Nord Cert based on ISO 14021.

Environmental labels/Certifications: Aurubis Hamburg, Pirdop and Lünen, the raw nickel sulfate producing sites, are certified to ISO 14001 and ISO 50001.

7. Interpretation and conclusions

The environmental impact of raw nickel sulfate is closely tied to copper cathode production with major contributions from concentrate mining and purchased blister. Emissions associated with purchased electricity and grid mix also play an important role.

The carbon footprint of Aurubis nickel sulfate per ton of nickel content is substantially below the global industry average thanks to investments in energy-efficient and low-carbon technologies.

Improvement in 2024 compared to 2023 is mainly related to improved profiles for copper cathodes in Pirdop and Lünen and lower profile allocated to nickel sulfate.

8. Verification

Verification type	Critical review in accordance with ISO 14040 (2021) and ISO 14044 (2021)
Verifier name & organization	Dr. Winfried Hirtz, Michael Sommer TÜV NORD CERT Prüf- und Umweltgutachtergesellschaft mbH Am TÜV 1, 30519 Hannover, Germany Phone +49 (0) 511 986-1172 Email whirtz@tuev-nord.de; micsommer@tuev-nord.de
Verification date	2/10/2025

The review confirmed that the LCA complies with the applicable standards and is scientifically and technically valid.

9. Disclaimer

This declaration has not been issued under a program operator and has not been verified in accordance with a PCR because none is available. The information is provided for transparency and B2B communication purposes.

10. Annexes

- A. LCA Report
- B. Benchmarking information: Nickel Institute, Life cycle data, Dec 2024, [2025-lifecycledata-executive-summary.pdf](#)

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