

2023 Update on the Terrafame Nickel Operation

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Terrafame location

Terrafame



Terrafame



Terrafame is the largest nickel producer in Europe.



Europe's largest nickel ore reserves are located in Sotkamo, Finland.



Terrafame is one of the ten largest zinc producers in Europe.



Terrafame's battery chemicals production line is one of the largest in the world.



Terrafame's carbon footprint is clearly smaller than traditional production methods.

Terrafame in numbers

Net sales 2022

584.4 MEUR

Net sales of battery
chemicals business
2022

207.1 MEUR

Operating result
2022

93.9 MEUR

Terrafame employees
31.12.2022

763

Partner companies'
personnel, average
2022

783

Nickel production
2022

31,550 t

Nickel sulphate
production capacity*

170,000 t/a

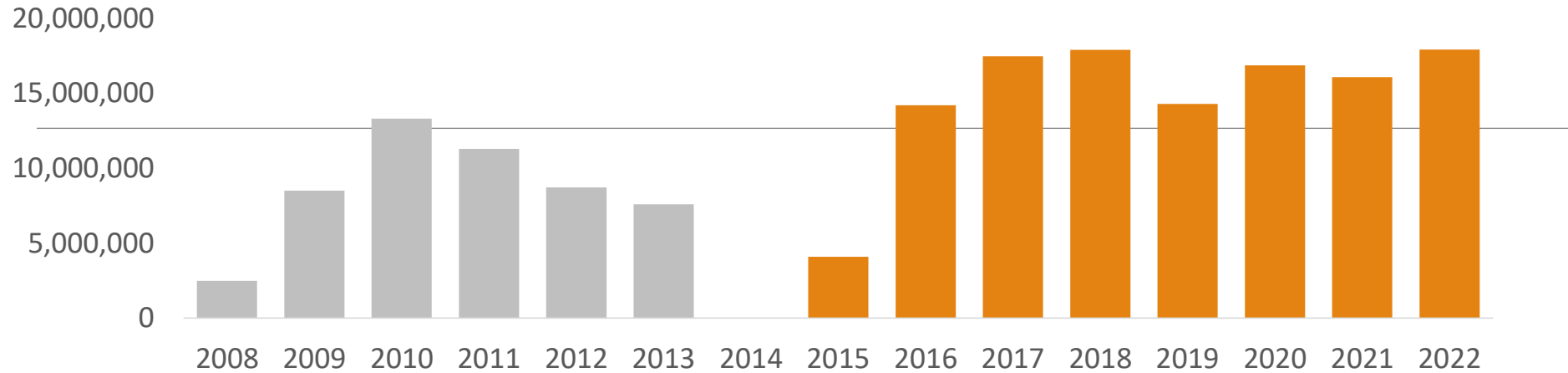
Cobalt sulphate
production capacity*

7,400 t/a

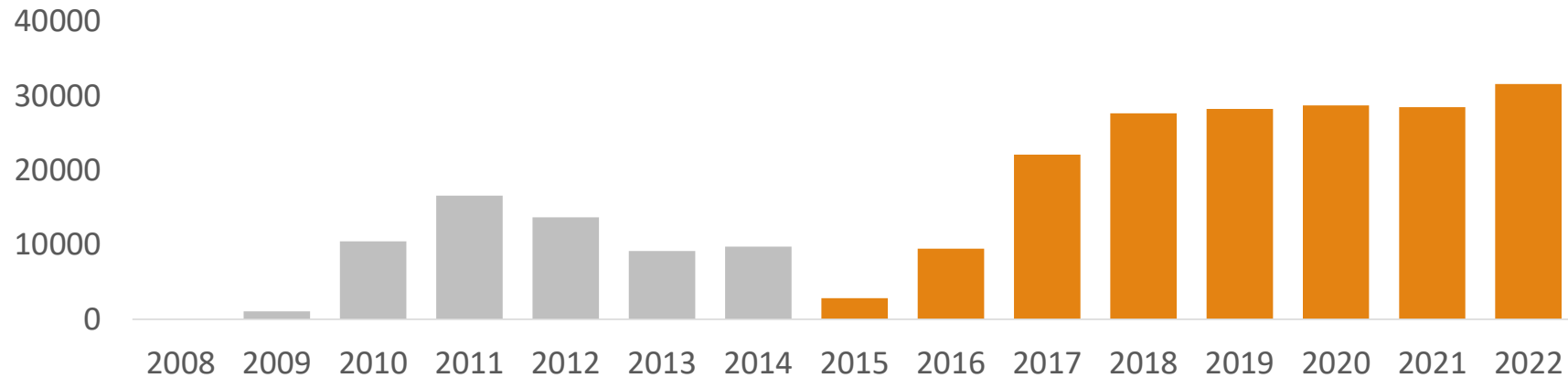
The new battery chemicals plant's ramp-up is ongoing.

Historical production at Terrafame mine

Ore mined, tonnes



Tonnes Ni produced



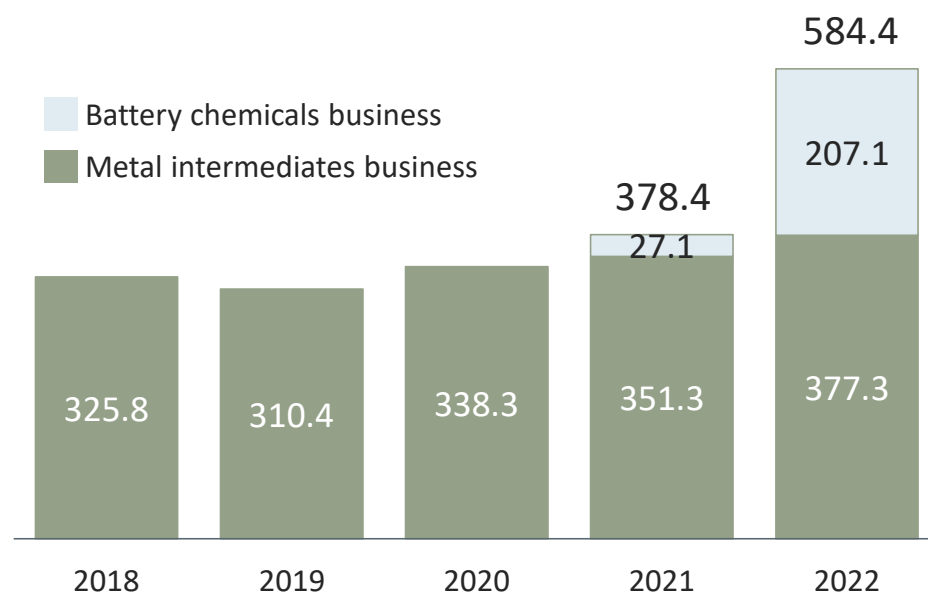
Mineral Resources and Ore Reserves will enable operations for several decades

- Terrafame updated its mineral resource and ore reserve estimates in 2022.
- The measured, indicated and inferred mineral resources amount to 1,451Mt.
- Content:
 - nickel 0.25%
 - zinc 0.52%
 - copper 0.14%
 - cobalt 0.019%

	Ni	Co	Cu	Zn
Metals contained in all categories	3.8Mt	0.3Mt	2.1Mt	8.0Mt

In 2022, the net sales of the battery chemicals business was already 35% of total net sales

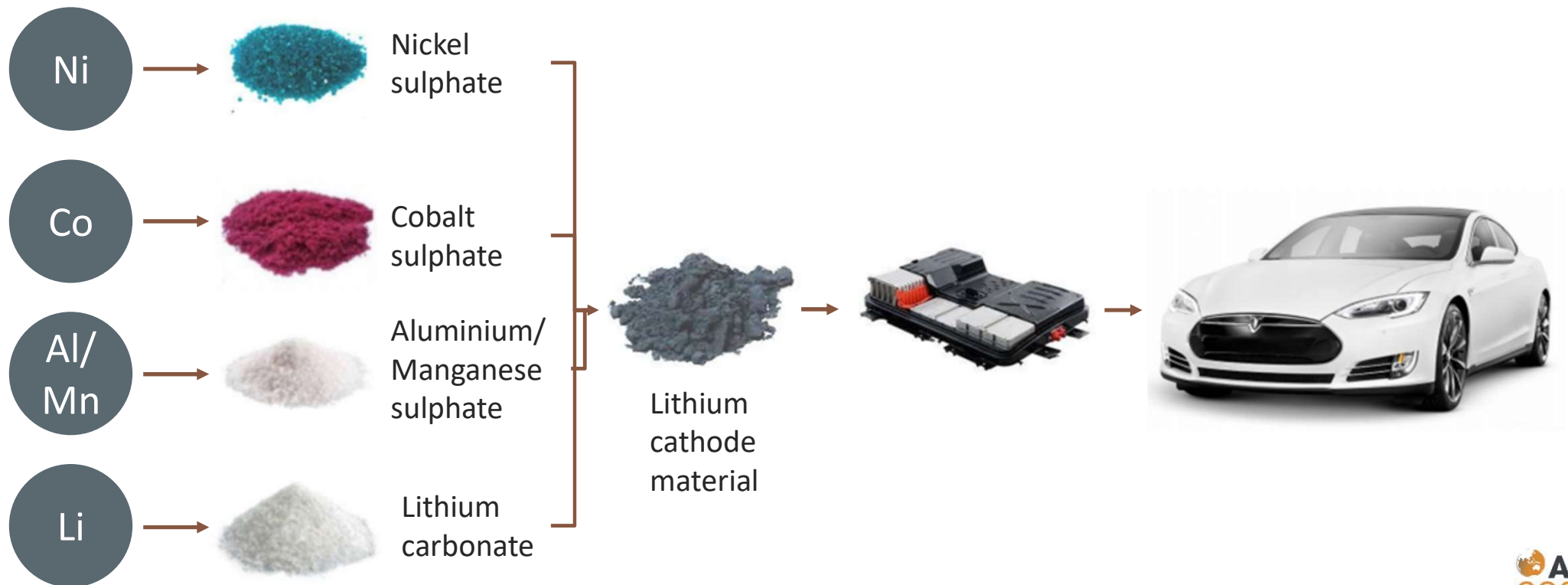
Net sales, EUR million



Battery chemicals plant

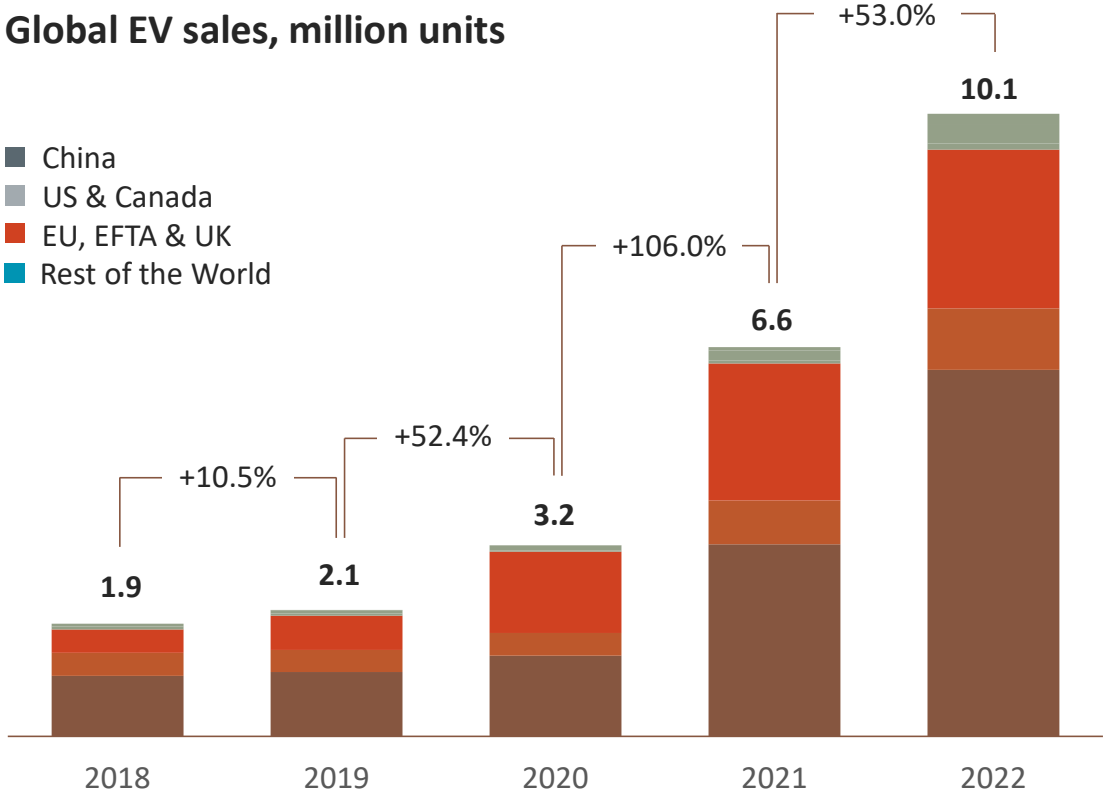
>> Terrafame is involved in electrifying the world

Nickel is one of the main raw materials for Li-ion batteries



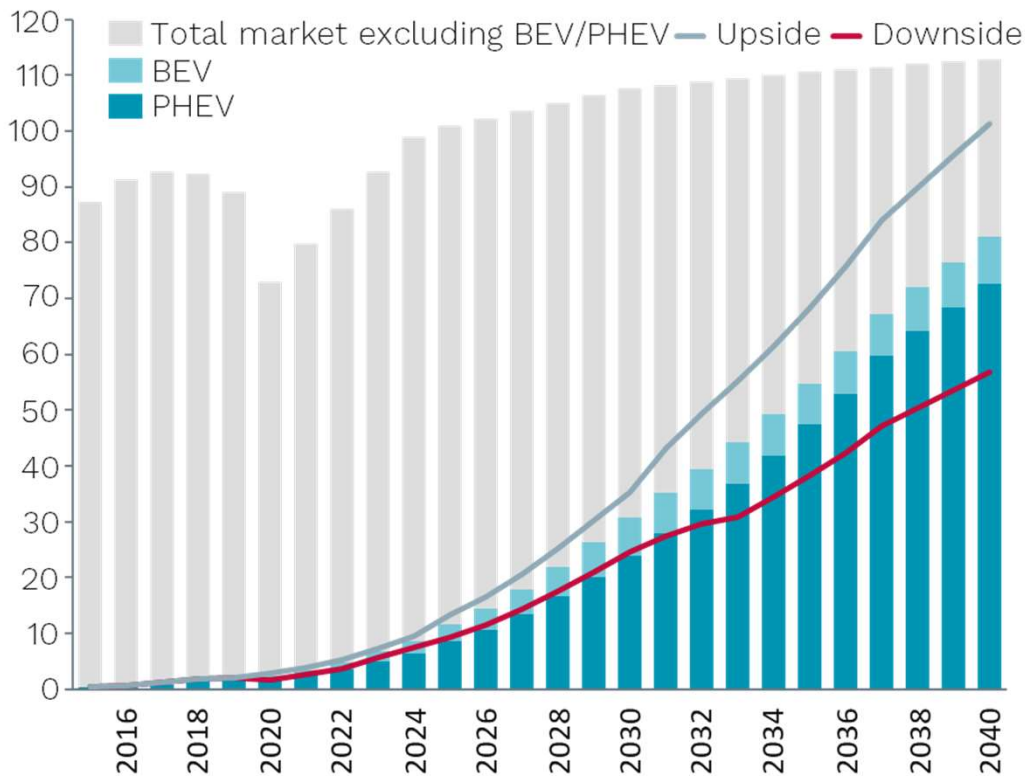
Electrification of transportation continues

Global EV sales, million units



EVs are taking over the roads

PC & LDV EV sales outlook, million units



Daimler

"25% EV penetration rate by 2025. 50% by 2030 as part of Ambition2039 scheme."

Nissan

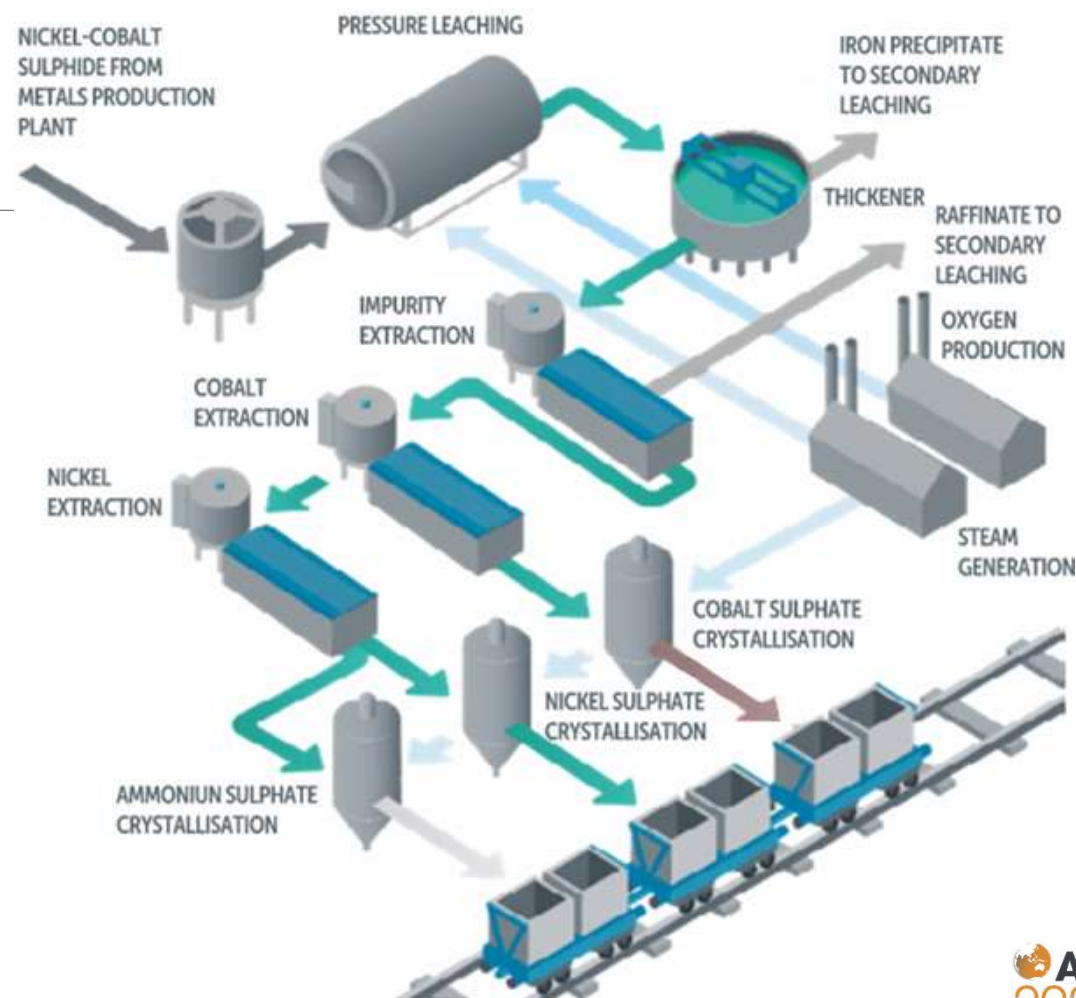
"1 million electrified vehicles annually by 2023, with EV penetration rate in Japan at 60%, China 23% and Europe 50%."

Volkswagen

"25% penetration by 2025, 40% penetration by 2030. In China, 50% NEV annual sales by 2025 (SAIC-VW, JAC-VW)."

Battery chemicals plant leads us to a special chemicals' producer

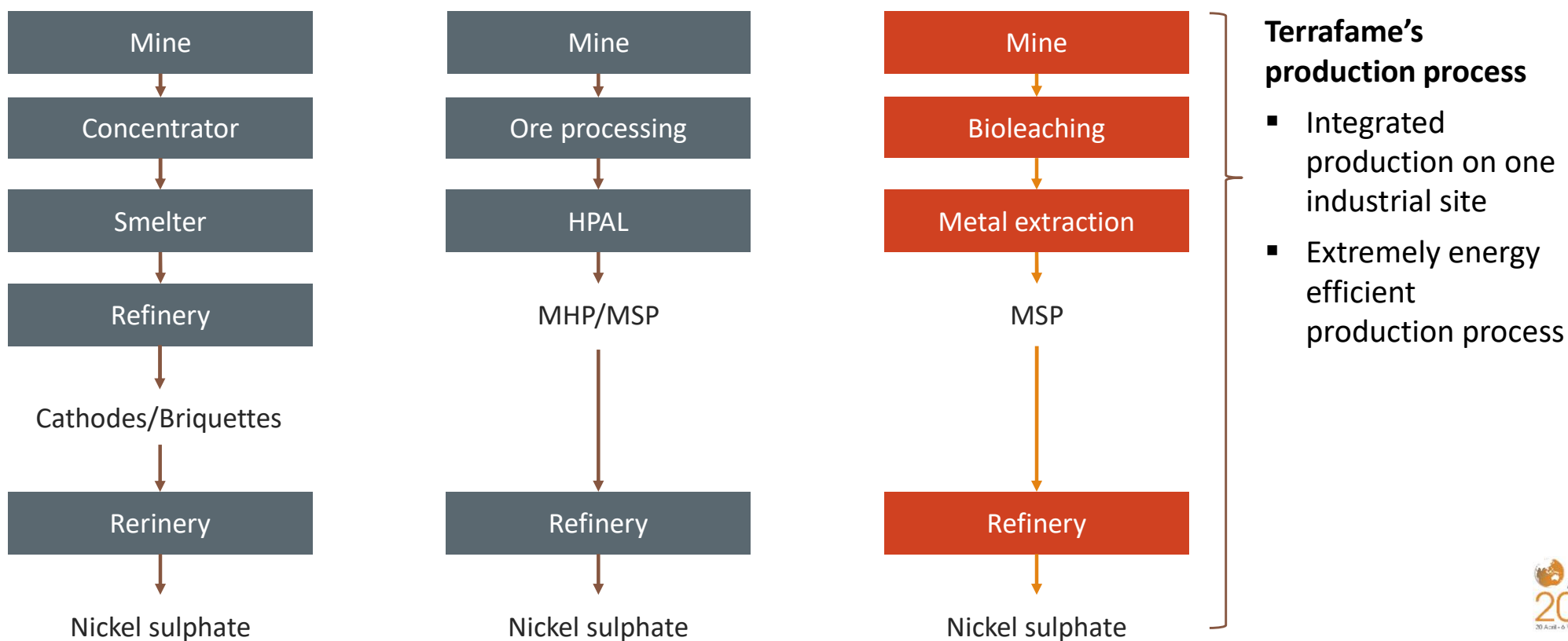
- Terrafame decided to invest in battery chemicals plant in 2018.
- The ramp-up of production at the plant started in June 2021, full capacity expected to be reached on 2024.



Production capacity

Nickel sulphate for EV batteries	170,000 t/a
Cobalt sulphate for EV batteries	7,400 t/a

Terrafame's bioleaching based production process is extremely energy efficient



Source: Life Cycle Assessment, Sphera Solutions GmbH

Terrafame's nickel sulphate production offers the lowest carbon footprint in the industry

According to an LCA-analysis produced by Sphera Solutions GmbH, the carbon footprint of one kilogram of nickel sulphate produced at Terrafame's integrated production plant is 1.75 kg CO₂-eq, compared to the industry average of 5.4 kg CO₂-eq.

- The analysis has been verified by Prof. Dr. Matthias Finkbeiner, Technical University of Berlin, Germany.
- Quality assurance and ISO 14040/44 compliance.

The life cycle analysis covers the entire production process starting from the mine and ending the forthcoming production of nickel sulphate.

Terrafame's result is compared to nickel sulphate production on average based on Nickel Institute life cycle analysis.

Global Warming Potential (GWP)
kg CO₂e/kg NiSO₄

