

# » Terrafame

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**Terrafame**

# » Our purpose is to enhance low-carbon mobility with our responsible battery chemicals



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 of the largest in worldwide.



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



**Terrafame**

# Enhancing low-carbon mobility with responsible battery chemicals

**Terrafame**  
BUSINESS MODEL



## IMPACT

Committed personnel – Safe working environment – Economic value-added – Solid customer experience



## TRACEABLE SUPPLY CHAIN, LOW CARBON FOOTPRINT

### INTEGRATED AND ENERGY EFFICIENT PRODUCTION

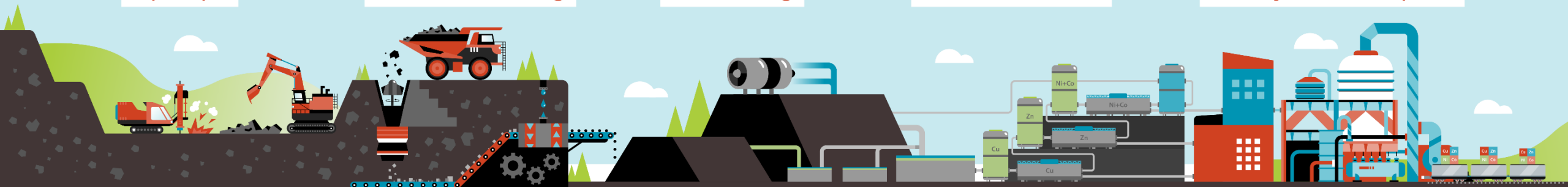
Open-pit

Materials handling

Biobleaching

Metals extraction

Battery chemicals plant



## RESOURCES

Largest nickel ore reserves in Europe – Skilled personnel – Wide partner company network

## VALUES

Safety – Commitment – Efficiency



# » Terrafame in numbers

Net sales 2023

**EUR 560,9 million**

Net sales of battery  
chemicals business  
2023

**EUR 167,5 million**

Operating result  
2023<sup>1</sup>

**EUR 38,4 million**

Terrafam employees  
31 Dec 2023

**842**

Partner companies'  
personnel, average  
2023

**1,000**

Lost-time injury  
frequency 2023<sup>2</sup>

**4.8**

Nickel sulphate  
production capacity<sup>3</sup>

**170,000 t/a**

Cobalt sulphate  
production capacity<sup>3</sup>

**7,400 t/a**

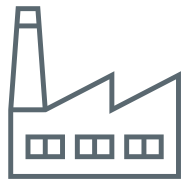
1) Excl. non-recurring items. An increase in an environmental provision recognised in the fourth quarter of 2023 had a negative impact of EUR 15.1 million on EBITDA and the operating result.

2) Terrafame and partner companies working at the site.

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

**Terrafame**

# »» Terrafame is largest industrial employer and third largest employer overall in Kainuu region



**1 900**

Total workforce working at the site during 2023.



**842**

Terrafame's own workforce at the end of 2023.



**79 %**

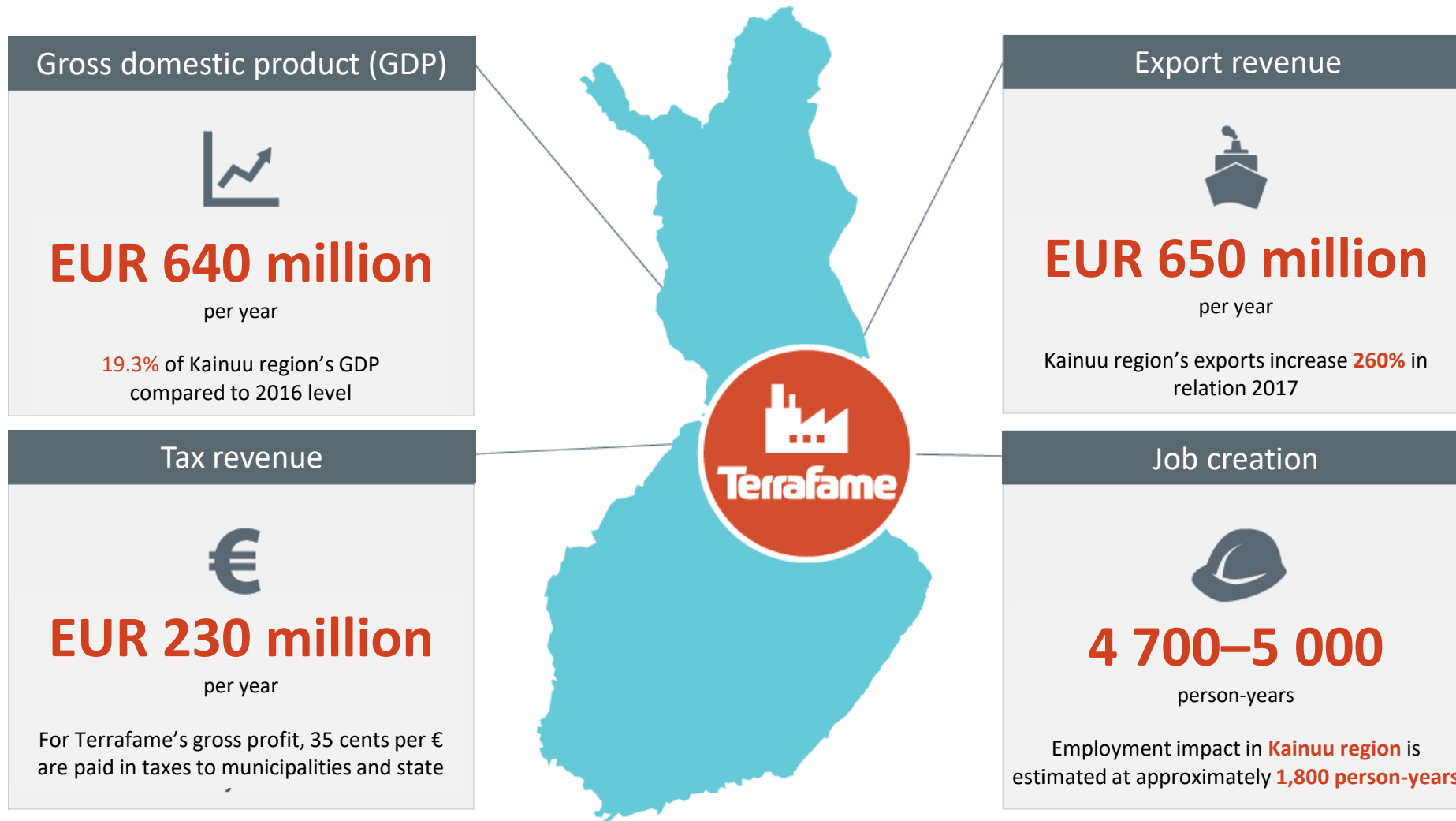
Of own workforce lives in Kainuu region.



**63 %**

Of contractors are from Kainuu or neighbouring regions (Pohjois-Pohjanmaa, Pohjois-Savo or Pohjois-Karjala)

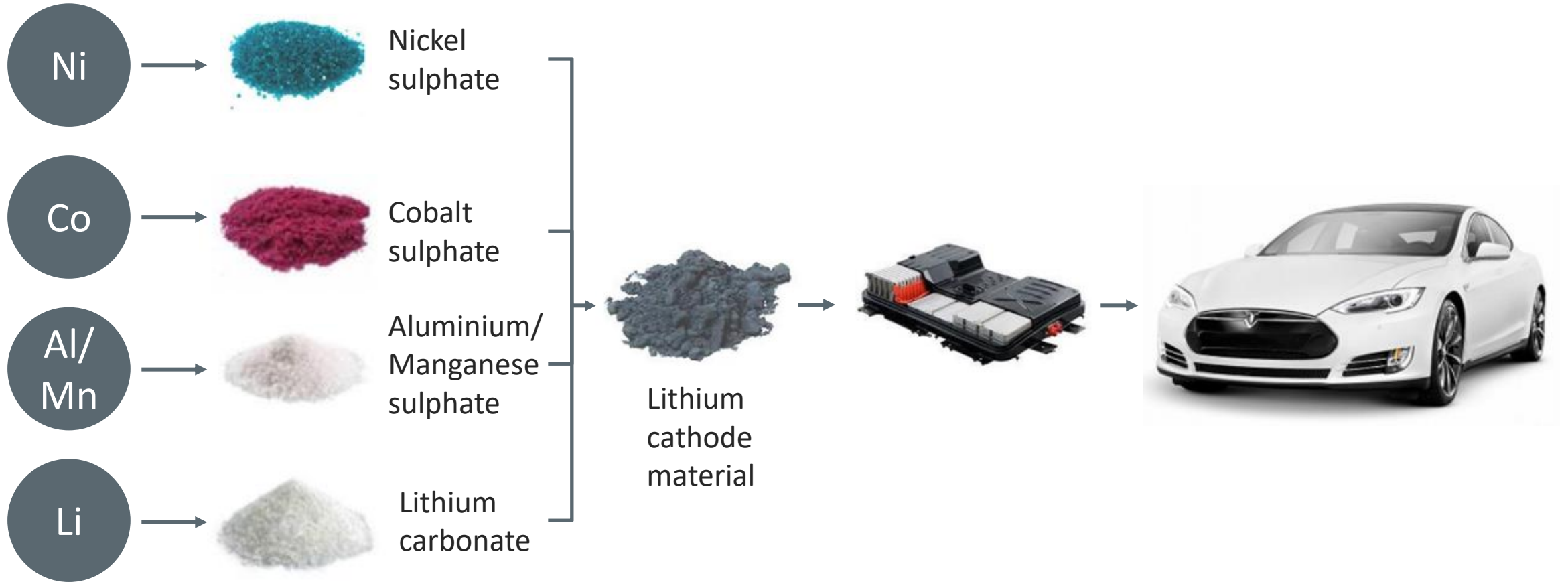
# » Terrafame's impact on the Kainuu and Finland's economy



Terrafame's estimated impact (with battery chemical plant) to regional economy

Source: Ramboll

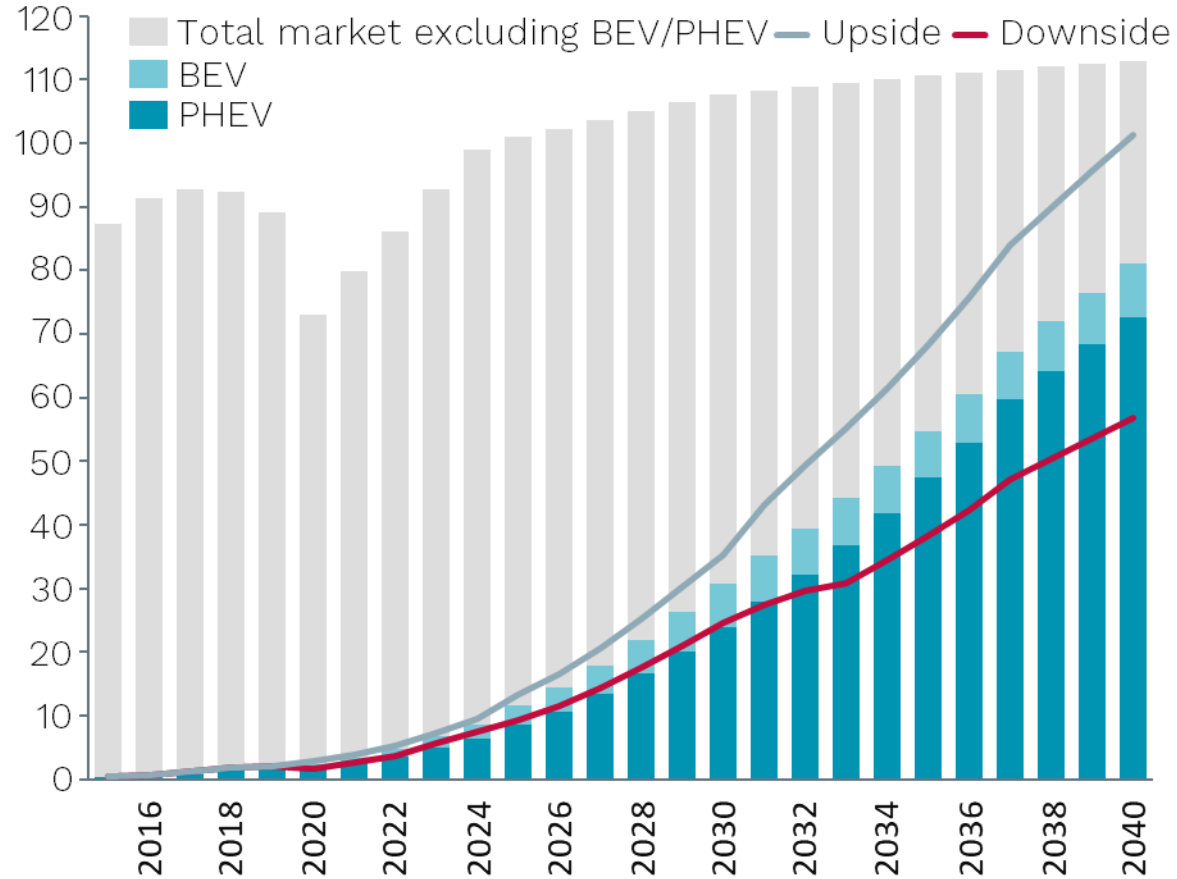
# » Nickel is one of the main raw materials for Li-ion batteries





# » 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

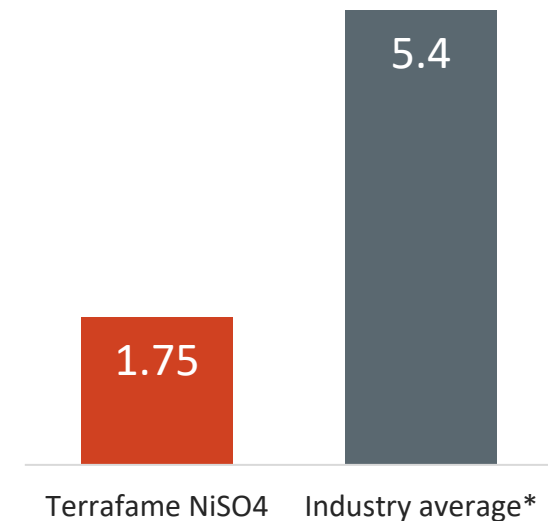
"25% penetration by 2025, 40% penetration by 2030. In China, 50% NEV annual sales by 2025 (SAIC-VW, JAC-VW)."

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

- Life cycle analysis has been produced by Sphera Solutions GmbH.
- 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 hexahydrate.
- Terrafame's result is compared to nickel sulphate production on average based on Nickel Institute life cycle analysis.

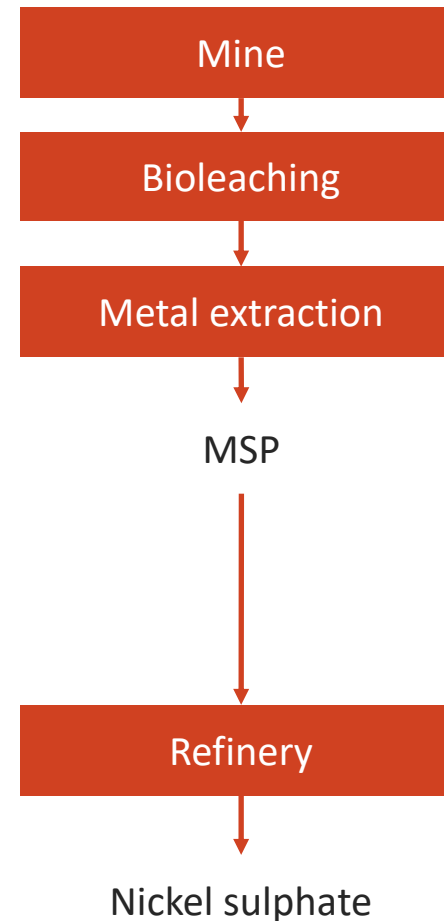
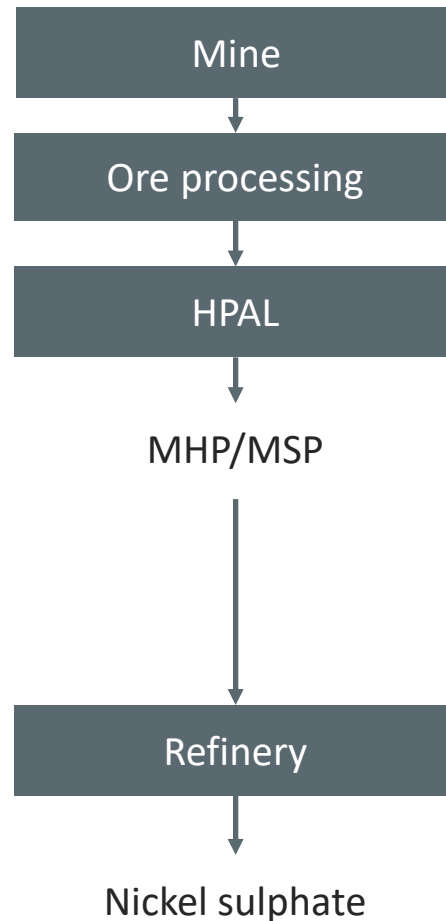
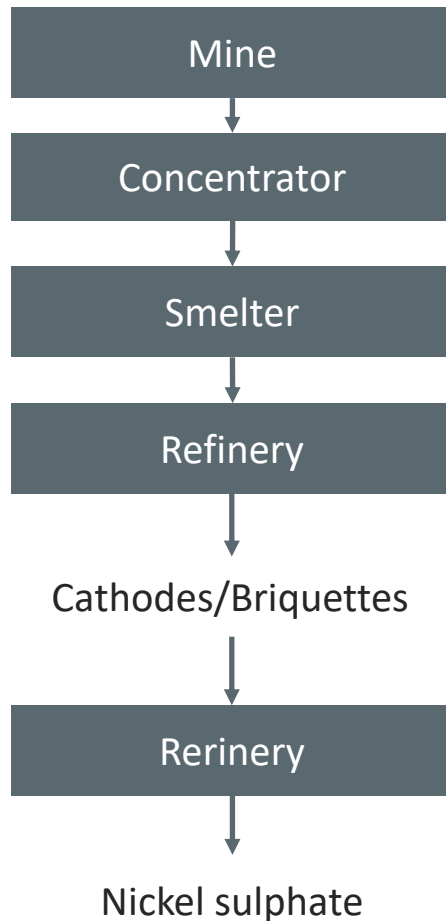
## Global Warming Potential (GWP)

kg CO<sub>2</sub>e/kg NiSO<sub>4</sub>



\*Life Cycle Assessment of Nickel Products, Nickel Institute

# » Terrafame's bioleaching based production process is extremely energy efficient



## Terrafame's production process

- Integrated production on one industrial site
- Extremely energy efficient production process

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A close-up photograph of a person's hand holding water. The person is wearing an orange high-visibility vest with reflective silver stripes and a blue long-sleeved shirt. The hand is positioned over a body of water, and the water being held is dripping, creating ripples on the surface below. The background is slightly blurred, showing a concrete structure and more water.

» Sustainability

# >> Policies and operating principles guiding our sustainability work

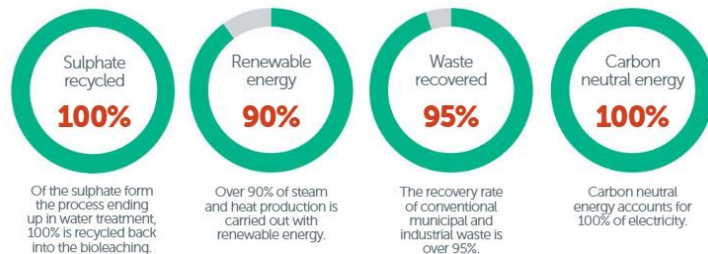
 <p>UN Sustainable Development Goals</p>	 <p>UN Global Compact</p>
 <p>Code of Conduct</p>	 <p>Company policies</p>
 <p>Corporate Governance Code 2020 (Securities Market Association)</p>	 <p>ILO Declaration on Fundamental Principles and Rights at Work</p>
 <p>Towards Sustainable Mining (TSM) Standard of the Finnish Network for Sustainable Mining</p>	 <p>UN Guiding Principles on Business and Human Rights</p>
 <p>OECD Guidelines for Multinational Enterprises</p>	 <p>OECD Due Diligence Guidance for Responsible Business Conduct</p>

# »» We are committed to advancing sustainable development worldwide and caring for the near-by environment

- Terrafame is committed to principles of Finnish mining standard (Towards Sustainable Mining).
- Our Sustainability Program sets solid goals for operational development for 2020–2024.
- The themes of the Sustainability Program are, where applicable, linked to the UN Sustainable Development Goals.



## Selected Sustainability Programme targets 2024



# » Sustainability programme 2020-2024

## Main goals

### ENVIRONMENTAL RESPONSIBILITY

- We are combatting climate change together with our EV-producing clients.
- Our production will be carbon neutral by 2039.
- We utilize the side streams from production efficiently.
- We minimize our emissions and impacts on waters and lakes.

### SOCIAL RESPONSIBILITY

- Terrafame is a safe place to work for both our own and our partners' personnel.
- We support and respect human rights and labour rights in our own operations. We require the same from our business partners.
- We are continuously developing our personnel's skills and possibilities to succeed.
- We engage in active dialogue with our stakeholders.

### GOOD GOVERNANCE

- Terrafame's operations are transparent.
- We ensure the compliance of our operations.
- Terrafame has a strong culture of doing the right things.
- Operations are based on continuous improvement and decisions are made based on facts.

# »» Environmental monitoring results are available at Terrafame's website

Monitoring results are available in Finnish at Terrafame's website at <http://www.terrafame.fi>

Quarterly reports on surface water and groundwater monitoring are also publicly available as well as other assessments by external experts.

Kainuu ELY centre has given their decision on the new monitoring programme, which is currently being processed at AVI.



## Ympäristötarkkailuraportit

Julkaisemme vuosittain ympäristötarkkailuraportin, joka kattaa muun muassa vesi- ja ilmapäästöjen sekä pohjavesien, pölylaskeumien ja jätejakeiden tarkkailun tulokset.

Vuosiraportin lisäksi julkaisemme myös pinta- ja pohjavesien tarkkailun neljännesvuosiraportit sekä muuta aineistoa ja selvityksiä.

### Vuosittaiset ympäristötarkkailuraportit

#### Vuosi 2022

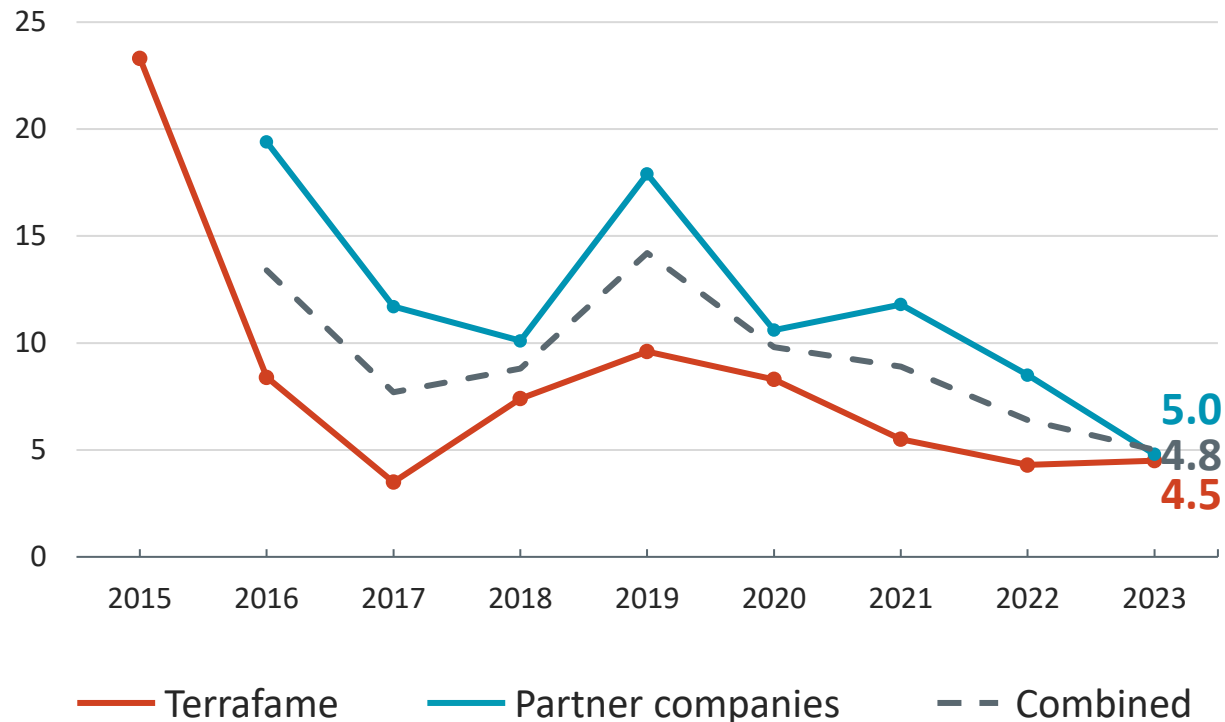
- [Osa 1: Tarkkailun yhteenveto](#) (243 kt)
- [Osa 2: Käyttötarkkailun tulokset](#) (1,0 Mt)
- [Osa 3: Vesipäästöjen tarkkailu](#) (7,0 Mt)
- [Osa 4: Ilmapäästöjen tarkkailu](#) (4,6 Mt)
- [Osa 5: Pintavesien tarkkailu](#) (44,7 Mt)
- [Osa 6: Pölymäärittelyt](#) (654 kt)
- [Osa 7: Kalataloustarkkailu](#) (2,6 Mt)
- [Osa 8: Pohjavesien tarkkailu](#) (26,6 Mt)
- [Osa 9: Pölylaskeuman tarkkailu](#) (5,8 Mt)
- [Osa 10: Jätejakeiden tarkkailu](#) (4,8 Mt)



# >> Target Zero

Our work to strengthen the safety culture on our industrial site continues

Rolling 12 month lost-time injury frequency (LTIFR)



Terraframe  
**842**  
employees at the  
end of 2023



Partner companies  
**1,000**  
employees in average  
in 2023

# Terraframe

# »» Stakeholder engagement activities

- **Townhall meetings annually to local residents living within 10 km from Terrafame**
  - Discussions on latest developments, safety and environmental monitoring, tour of the site
- **Stakeholder representatives working group twice per year**
  - Representatives from the local stakeholder groups (municipalities, businesses, village and fishing associations, NGOs, regional administration)
  - Discussions on latest developments and topics selected by the working group
- **Sponsorship**
  - Local sports and culture
- **Local schools**
  - Vocational education and higher education
  - Systematic cooperation with local elementary schools

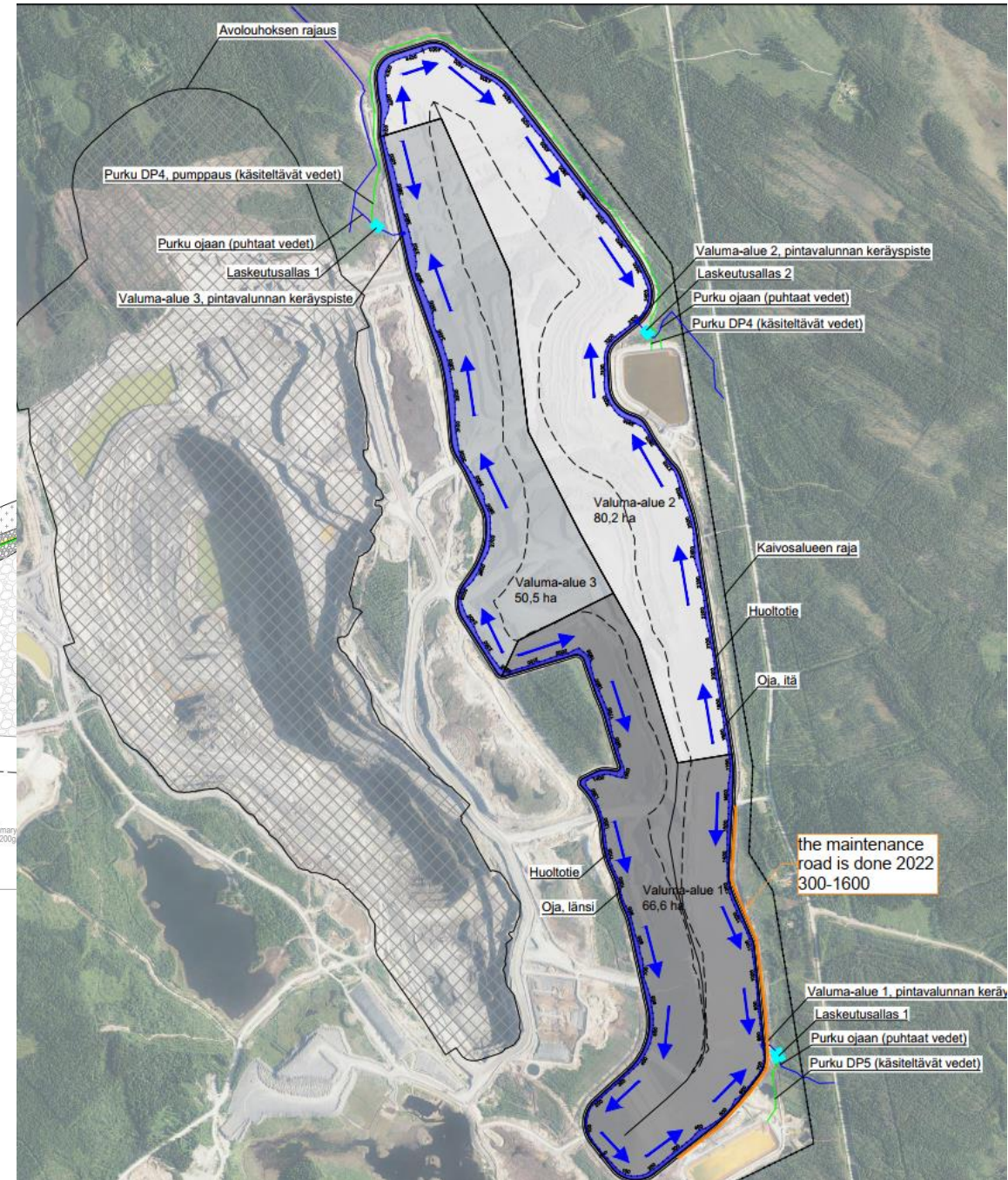
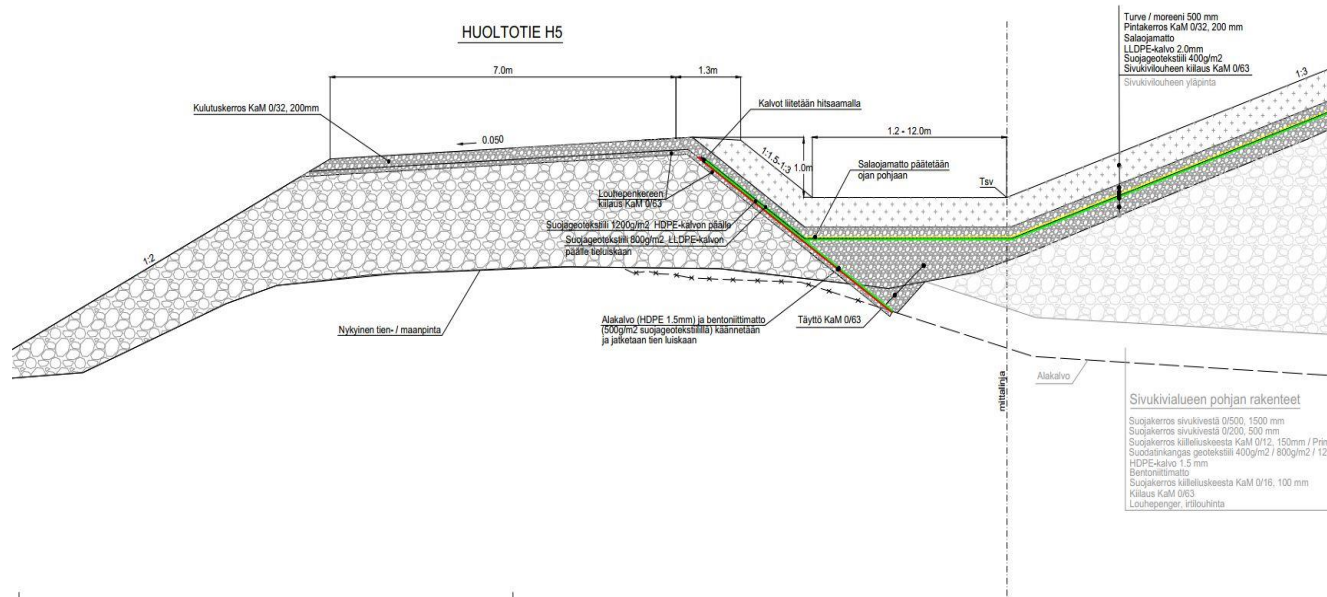




»» Future  
developments

# » Closure actions will start during production: planning ongoing

Terrafame is committed to mine closure activities while operations are still ongoing



# » Terrafame's uranium recovery enhances carbon-free energy production

## Uranium recovery and utilization is sustainable

- Nuclear power production does not result in carbon dioxide emissions.
- The launch of uranium recovery will make the utilization of ore mined by Terrafame more efficient.

## Recovery will start by the summer of 2024

- The preparations require investments of approximately EUR 20 million.
- The recovery of uranium will increase Terrafame's net sales by approximately EUR 25 million per year.
- The recovery plant is estimated to operate at full capacity by 2026.

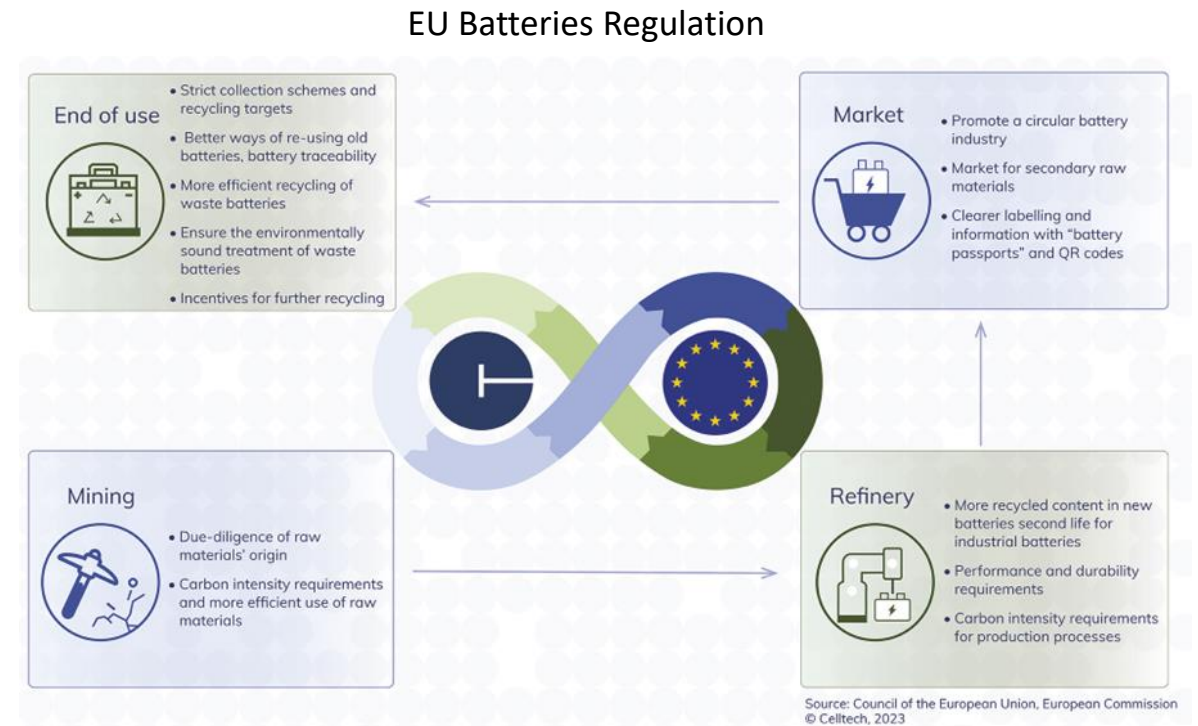


Terrafame's uranium recovery plant will have an annual capacity of 200 tons. This corresponds to about half of the need of a plant equivalent to Olkiluoto 3.

**Terrafame**

# » Utilization of secondary raw material at the BCP

- Fortum and Terrafame signed an agreement in June 2023 for a pilot project in which metals recovered from the black mass of EV batteries by Fortum will be utilised in Terrafame's battery chemical production.
- Terrafame aims to integrate recycled battery material feed to existing battery chemicals plant in 2025 and gradually increase the amount of recycled feed. The aim is that by 2029, the nickel sulphate produced by Terrafame contains up to 6,1 % recycled Ni on annual level
- The collaboration between Fortum and Terrafame will enable an even more sustainable value chain to meet the needs of the European battery manufacturing industry set by the EU Batteries regulation.
  - Blending obligation, i.e. the requirement to use recycled raw materials in new batteries (16% for cobalt, 85% for lead, 6% for lithium and 6% for nickel)



# » 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%

Metals contained in all categories

Ni	Co	Cu	Zn
3.8Mt	0.3Mt	2.1Mt	8.0Mt

Kolmisoppi  
810Mt

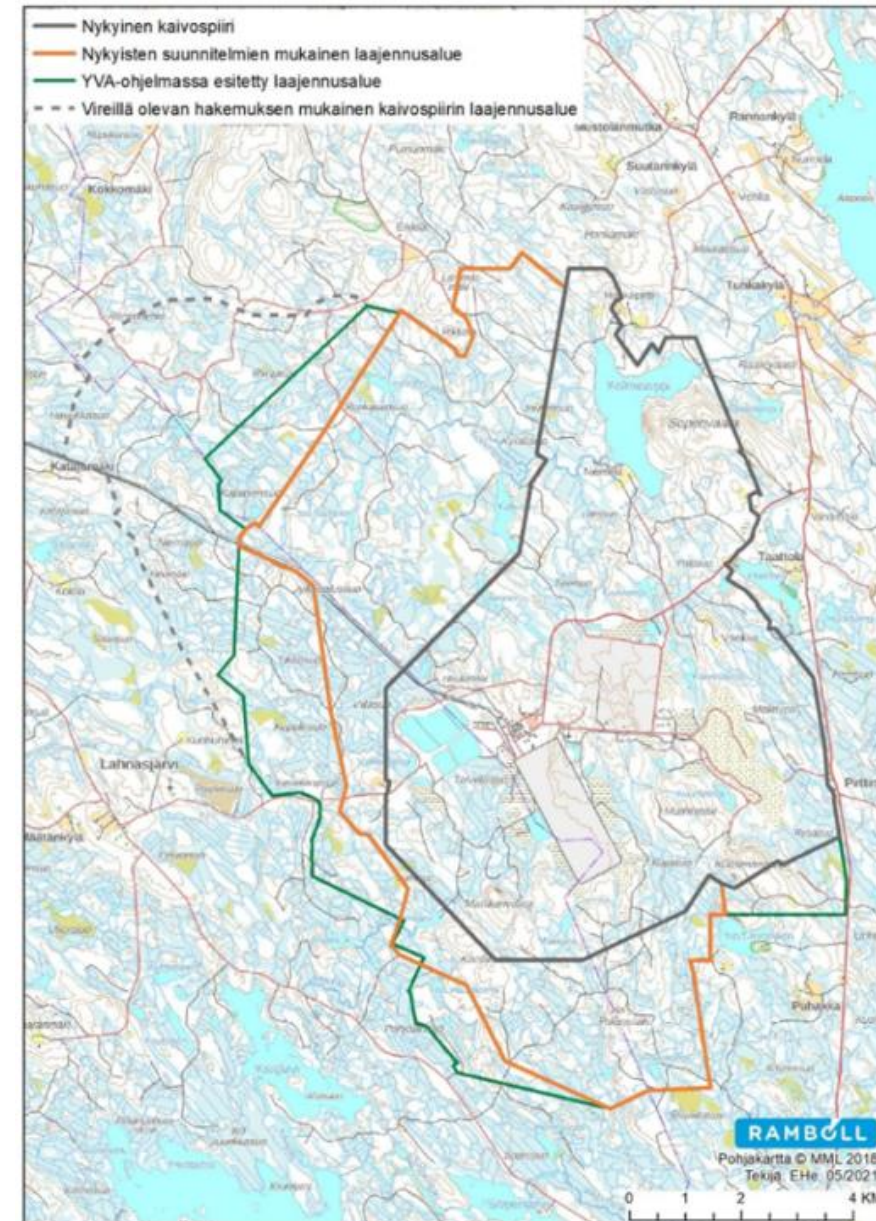
Ore prospecting  
area

Kuusilampi  
641Mt



# »» Kolmisoppi project

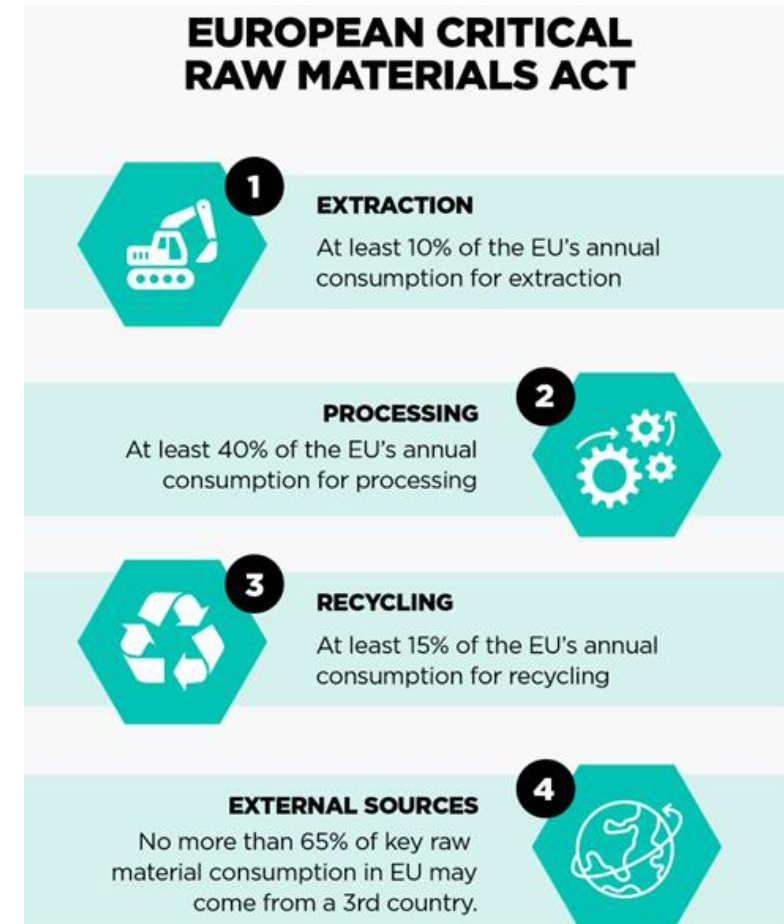
- Aim is to exploit the second mineral deposit on the current mining district
- This would also require expansion of mining district area to accommodate for the space required for new bioheap leaching and siderock areas
- These actions would enable mine life extension until 2050s.
- During ESIA process project alternatives were assessed and ways to minimize environmental impacts and reduce the required land area.
- Terrafame has submitted a permit application in 2023 for mining on the land area in between Kuusilampi and Kolmisoppi. Permit application for Kolmisoppi water area mining will be submitted at a later date.





# » Significance of Kolmisoppi project

- Terrafame is Europe's largest Ni and Co mine, today producing 70% of all Ni mined in Europe
- By 2030, Terrafame will alone cover over 10% of EU demand for **battery grade Nickel** and over 1% for battery grade Cobalt\*
- The CO2 footprint of Terrafame's nickel sulphate (1,75t CO2 / t NiSO4) is among the lowest in the world, and about ten times lower than Ni produced in Indonesia
- The mine expansion (Kolmisoppi) at Terrafame will ensure sustainable production of Ni and Co in EU for decades
  - Critical for the EU to reach the 2030 benchmarks of the CRMA for Nickel (battery grade) and to ensure sustainable CRM production until 2050





# Terrafame

**Enhancing low-carbon  
mobility with responsible  
battery chemicals.**

[www.terrafame.com](http://www.terrafame.com)

