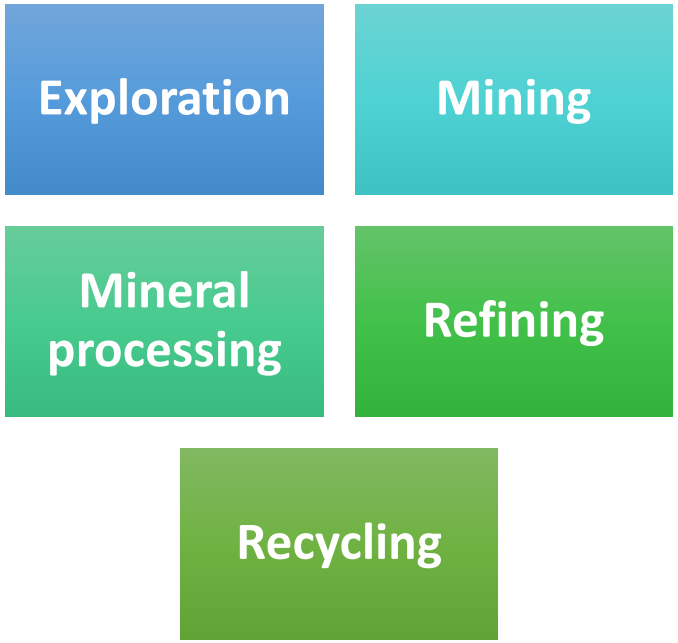

European
Technology
Platform
on Sustainable
Mineral Resources

ETP SMR - What is it?

The European Technology Platform on Sustainable Mineral Resources (ETP SMR) is an **association of entities operating in the Mineral Resources R&I sector across the whole value chain.**

Our mission is to develop long-term European Minerals Industries Research and Innovation agendas and roadmaps for actions at EU and national level.



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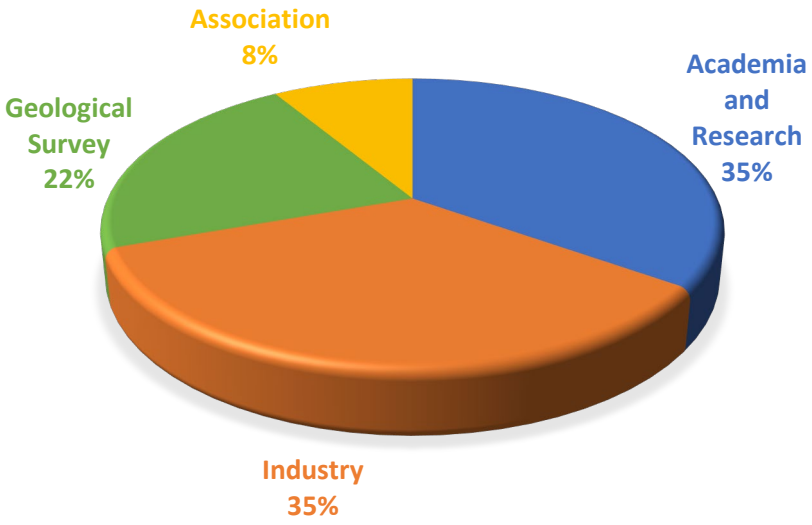
Members



- Raw materials Industry
- Technology providers
- Geological Surveys
- Academia and Research Institutes
- Industry & Stakeholder Associations
- International partners

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29 Members

MONTAN UNIVERSITÄT WWW.UNILEOBEN.AC.AT

NTNU Norwegian University of Science and Technology

LIÈGE université

UNIVERSITY OF OULU

LULEÅ UNIVERSITY OF TECHNOLOGY

Trinity College Dublin Coláiste na Tríonóide, Baile Átha Cliath The University of Dublin

RI. SE

Łukasiewicz Institute of Non-Ferrous Metals

GKZ Freiberg

euromines

IMNR

MINTEK

Mineral and Energy Economy Research Institute Polish Academy of Sciences

GTK

TNO innovation for life

SGU

brgm Géosciences pour une Terre durable

EuroGeoSurveys European Geoscience for Society
The Geological Surveys of Europe

SANDVIK

RHI MAGNESITA

Epiroc

K+S Experience growth.

TECNICAS REUNIDAS

Zinkgruvan Mining a subsidiary of lundin mining

BOLIDEN

LKAB

talga

svemin.

Summary of activities Nov. 2023 - 2024

ETP SMR 15th General Meeting
Örebro, Sweden | 1-2 November 2023

ETP SMR 16th General Meeting
Trondheim, Norway | 4-5 September 2024

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Update of the ETP SMR Strategic R&I Agenda

- **Update ambitions to match current needs**
  Two workshops, Dec 2022 and March 2023,
  + consultation procedure on a first and second draft

- **The World's climate ambitions increase the need for metals and minerals and also highlights also the need for climate neutral mining-, processing/refining-, and recycling operations**

- **Changed geopolitical context – security of supply cannot be taken for granted**

- **New RM for emerging technologies the EU aims for leadership**

- **Advise the European Commission on relevant R&I needs for the mineral raw materials industries to enable secure and sustainable raw materials for the EU industries in line with the ambitions of the CRMA.**

https://www.etpsmr.org/?post_documents=etp-smr-strategic-research-and-innovation-agenda-2023

Raw Material Week - November 2023

Impulse speech EU-Raw-Materials-RI-Day
Katarina NILSSON: ETP SMR Strategic Research and Innovation Agenda for 2025-2030 (13 Nov. 2023)

ETP SMR SRIA Launch
RMW side event
(13 Nov. 2023)

Workshop on the Strategic R&I Agenda for the proposed Co-funded Partnership Raw Materials for the Green and Digital Transition
Co-organised with ERA-MIN3
(14 Nov. 2023)

Events & Conferences

- **PROMETIA 10th Scientific Seminar (Nov. 2023) -** ETP SMR SRIA presentation
- **PDAC 2024 (March 2024)** - Our activities were showcased on the screens of the European Commission stand, & discussions and presented our SRIA.
- **EIT Raw Material Summit (May 2024) -** Julie Hollis panellist in the "Addressing the Energy Storage and Conversion Realities" session
- **IndTech2024 (June 2024) -** Kacper Chmielewski was invited to be part of a roundtable: "*Changing the raw materials landscape: a SRIA for an EU co-funded Raw Materials Partnership*". Discussion on ETP SMR's SRIA and its link with ERAMIN's SRIA and the CRM Act.
- **EUSEW 2024 (June 2024) -** EU Sustainable Energy Week in Brussels
- **IGC 2024 (August 2024)** – 37th International Geological Congress

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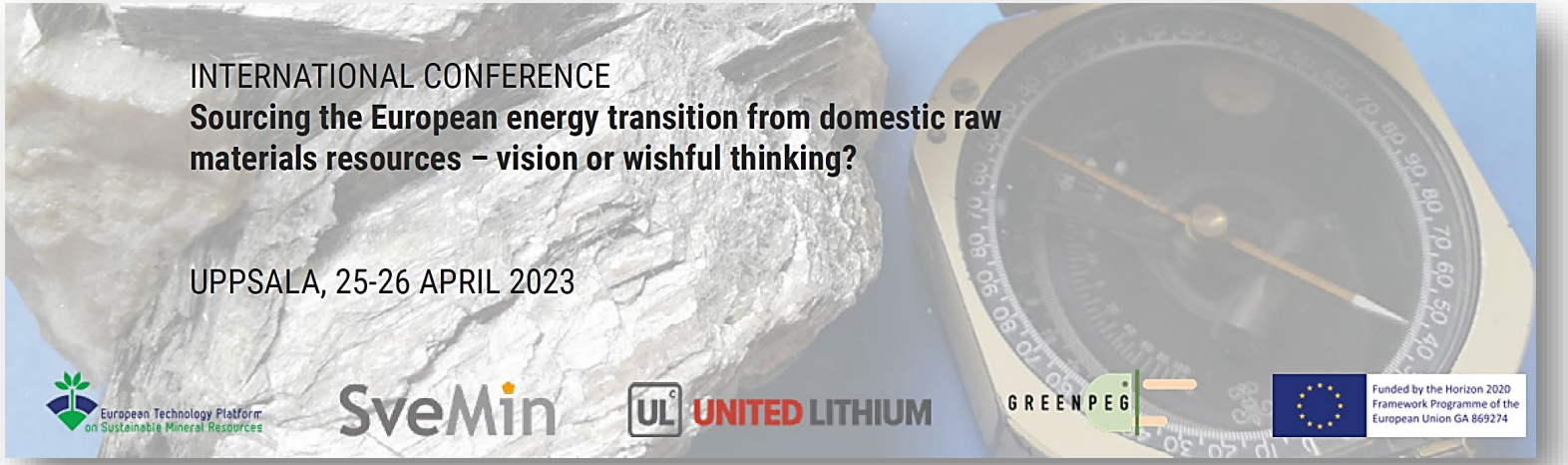
Involvement of EU R&I actions in joint clustering and networking using ETP SMR

ETP SMR co-hosting the International Raw Materials Conference
Uppsala 25.-26.4.2023

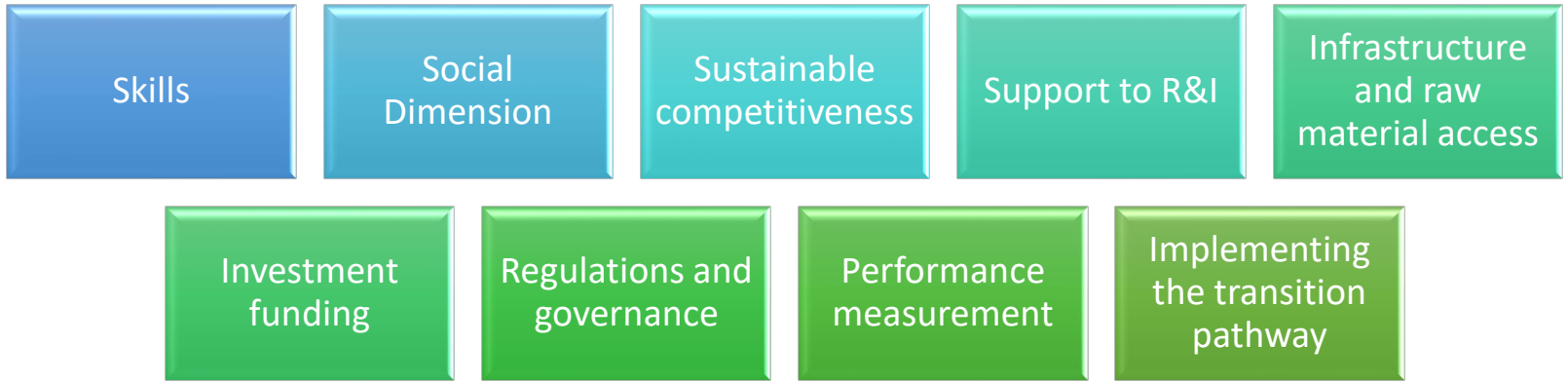
"Sourcing the European energy transition from domestic raw materials resources – vision or wishful thinking?"



ETP SMR: Shaping Energy-Intensive Policies Through Sub-Group Work and Consultation Response

- **ETP SMR activities in sub-group of the High-Level Group on Energy-Intensive Industries**

ETP SMR is actively involved in a sub-group of the High-Level Group on Energy-Intensive Industries. This group is working with the European Commission to develop a Transition Pathway (TP) for the European metals industry (both ferrous and non-ferrous).
Our members played a key role by providing valuable feedback on draft documents in **December 2023, April & July 2024**.
These documents covered crucial areas like:



- **Feedback on ERA MIN's 1st Draft of the Strategic Research and Innovation Agenda** (SRIA) on Raw Materials in April 2024.

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The role of research and innovation in ensuring a safe and sustainable supply of critical raw materials in the EU

The **European Parliament's report** mentions ETP SMR's SRIA several times.

https://www.europarl.europa.eu/RegData/etudes/STUD/2024/762848/EPRS_STU(2024)762848_EN.pdf

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NEWSLETTERS

Nov. 2023

January 2024

March 2024

July 2024

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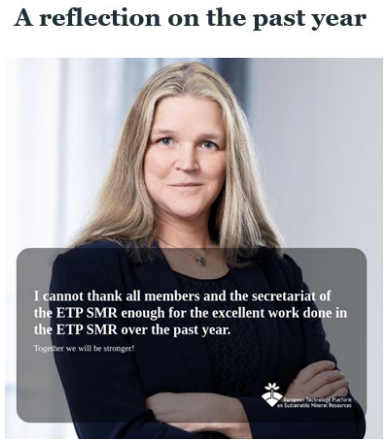

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SOCIAL MEDIA

Connect with us on social media!

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Actions 2024-2025

- **Workshop for <u>members only</u>** in conjunction **Raw Material Week 2024**

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Why should you join the ETP SMR?

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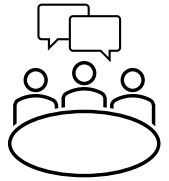
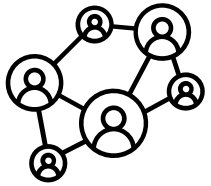
- ✓ **Meet with stakeholders from**: minerals industry, metallurgy, technology & machinery providers, research community, regulators, consumers, associations, civil society **centered around the major technological challenges of the raw materials sector.**
- ✓ **Gain visibility and recognition from the European Commission** (DG GROW), our key contact in defining research strategy priorities and innovation actions in the Mineral Resources sector, as well as the broader EU industry, research and policy community, particularly through our participation in strategic events such as EU Raw Materials Week, where ETP SMR is invited to participate and propose speakers.
- ✓ **Be a part of our ETP SMR Strategic Research and Innovation Agenda (SRIA)**, established and driven by our members and defining their common vision of the future challenges, highlighting current needs and gaps. The SRIA serves as an input to the European Commission's research programmes highlighting topics that need to be addressed within the multiannual work programme on raw materials, including calls and partnerships.
- ✓ **Engagement with strategic partners in the raw materials R&I sector**, including close cooperation with exploration and mining companies and other industries from the private sector across the raw materials value chain, as well as the public sector national Geological Surveys of Europe.
- ✓ **Access latest news in the raw material sector** concerning research and innovation projects and European policy developments.
- ✓ **Provide input into the framing of strategic Position Papers on issues of key relevance** to the Raw Materials sector and to the implementation of EU policy and legislation.
- ✓ **Preferential access to an established network of partners for collaboration in raw materials research and innovation projects**.
- ✓ **Become part of a larger community** and **gain visibility on the European stage**.



European Commission



ETP SMR Strategic Research and Innovation Agenda (SRIA) – Summary

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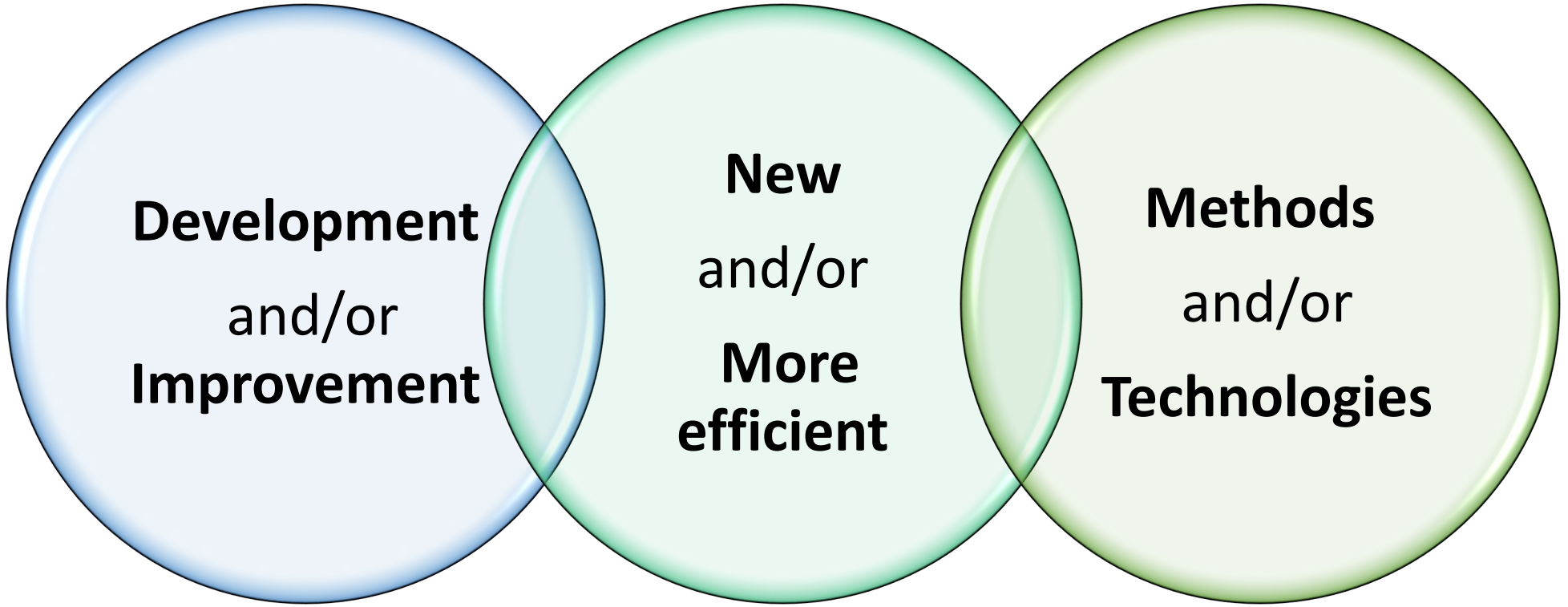
Needs for Research and Innovation



Need for Research and Innovation in Exploration

- **No new mines without exploration**
- **< 2% of investments in exploration** are allocated to **EU Member States**
- **CRM Act – Member States** shall draw up **national exploration programmes**
- Mineral potential - **Europe is underexplored**

Challenges

- **Skills shortage**
- Need:
  - **R&I** to **discover** and **understand ore deposits** in Europe
  - **Technology** to **process**, **extract** and **recycle** CRM/SRM
  - **Collaboration** with strong exploration & mining jurisdiction

Credit: GKZ Freiberg

R&I – Mineral potential

✓ Strengthen efforts to **improve the EU's exploration capabilities by linking R&I actions to the Member States Exploration Programs** (actions needed now, however long term effects)

✓ **Improved knowledge base** on the **vast variety of European ore types** (not limited to MS Exploration Programs) and **cost-effective exploration technology.**

R&I – Policy

✓ **Examination of policy and legislative barriers to the EU's ability to increase domestic production from both primary and secondary sources.**

(Credit: EPIROC)

What are the expected impacts?

Reduced:

- ✓ ore losses through improved mineral deposit models
- ✓ mining waste through increased resource efficiency

Increased:

- ✓ knowledge of Europe's mineral deposits (incl. CRMs & SRMs)
- ✓ understanding of mineralizing processes in different environments
- ✓ attractiveness of exploration investments

Improved:

- ✓ efficient use of old mining waste as a secondary raw material
- ✓ European resilience and self-sufficiency regarding strategic and CRMs, providing responsibly produced minerals and metals to European industries

Provision of technology and knowledge required to discover and characterize new mineral deposits

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Need for Research and Innovation in Mining

Energy & Electrification

Key for lowering CO2 emissions

- **Energy- and cost-efficient:**
  - mining and quarrying processes
  - transportation in the mine/ quarry
- **Development** of **climate-neutral** mining, quarrying technology & processes
- **Mechanical excavation methods** for **hard rock conditions** and **continuous mining**
- **Improving** & **developing ventilation, air quality control,** and on-demand **temperature control**

Production & processes

- **Resource-efficient mining**
- **Sustainable resource management** (reduce water and energy consumption)
- **Deep mining solutions** for **high rock stress environments**
- **Alternative materials** for **backfill**, **rock support**, and **explosives to reduce emissions**
- **Efficient backfilling techniques** with **increased use of waste** while **addressing challenges with properties, stability & subsidence**

Automation

Key enabler of operational safety and efficiency

- **Reliable communication networks** with **real-time capabilities**
- **Automation features** enabling **closed process cycles** with **interaction remotely or totally adaptive optimisation** => "**zero persons at face**"
- **Predictive maintenance** from supply chain to recycling with green, sustainable focus, securing robustness and 24/7 operations
- **Digital test simulation environments**, **AI** & **on-edge technology**

Digitalisation

Focus on end-to-end processes creating interoperability

- **Explore digital technology possibilities** to provide the best possible conditions for deep mining (incl. digital twins)
- Use of **AI in the mining and quarrying environment / processes**
- **Create digital environments** from technology development, system integration, to cybersecurity
- **Use digitalisation technology**: creating & connecting value in and between process areas
- **Interoperability:** communication man2machine / machine2machine / machine2process systems to **optimize / increase mining efficiency** and **safety**
- **On-line analysis** for **agile decision-making**
- **Autonomous** or **remote-controlled operations**

(Credit: GKZ Freiberg)

What are the expected impacts?

Minimized:

- ✓ environmental and climate impacts of mining
- ✓ dilution and maximized ore recovery

Reduced:

- ✓ total energy consumption per tons of produced ore
- ✓ waste rock

Increased:

- ✓ social acceptance
- ✓ European export of world-class mining and environmental technology

Improved:

- ✓ cost-efficient mining
- ✓ safety in mining operations
- ✓ attractive working environments

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Need for Research and Innovation in Mineral Processing

Traceability and industry integration

- **Global Passport** - traceability through the value chain

Process optimization

- **Comminution technologies**
  - ✓ Measurement technology
  - ✓ Models for optimizing design
  - ✓ Control of comminution and separation circuits
- **Efficient wet and dry separation processes / technologies**
  - ✓ Treating polymetallic and complex ores
  - ✓ Removing impurities
  - ✓ Improving recovery of low-grade
- **Geometallurgical modelling**
  - ✓ Process mineralogy
  - ✓ Analytics for resources characterization
  - ✓ Economical optimisation
  - ✓ Ore traceability
- **New** and **smart process design and methods**
- **Model-predictive control concepts and data-driven models** (digital twins)

Environmental performance

- **Flotation reagents** (effects on downstream processing, water recirculation, and health and safety)
- **Water treatment methods**
- **Feasibility of dry stacking in wet climates**

Recycling and secondary feed streams

- Design for **end-of-life products**
- **Automation**
  - ✓ Identification of the source
  - ✓ Dismantling and separation

System integration

- **Digitised processing plants** (advanced online characterization, sensor technology, and data analytics)
- **Integration with upstream and downstream processes** (geology/mining and smelter processes)
- **Coupling of business sectors and development of new business models**

(Credit: Boliden)

What are the expected impacts?

Reduced:

- ✓**energy consumption**
- ✓**losses of valuable minerals** (including CRMs)
- ✓**cost** (less energy consumption and wear)

Increased:

- ✓**revenue** through **cost-effective production of by-products**
- ✓**security of supply** of raw materials

Improved:

- ✓**environmental performance** (e.g., climate impact, water management, emissions, tailings)
- ✓**social acceptance of mineral processing plants** due to higher resource efficiency, lower emissions, and less waste

Developed intelligent production systems

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Need for Research and Innovation in Metallurgy / Metals recovery & Recycling

New materials for emerging technologies
(procurement/production/recycling)

Traceability and industry integration

- **EU's digital product passport** in the recycling industry for circular economy

Decarbonisation

- **Climate neutral processing** & **refining technologies** (incl. use of reagents with no carbon footprint)
- **Alternative carbon free reduction agents** (technically & economically viable)
- **Decarbonisation of energy intensive** metallurgical processes

Environmental performance

- **Methods** for **optimized use** of **energy** & **water**
- **Development** of **technologies** with **low atmospheric** & **water emissions** with **minimal impact on the environment**

Process- and resource optimisation (primary- and secondary resources)

- **Process design optimization** using **thermodynamic data,** considering **efficiency in the process route** (new measurement technology, process modelling & automation)

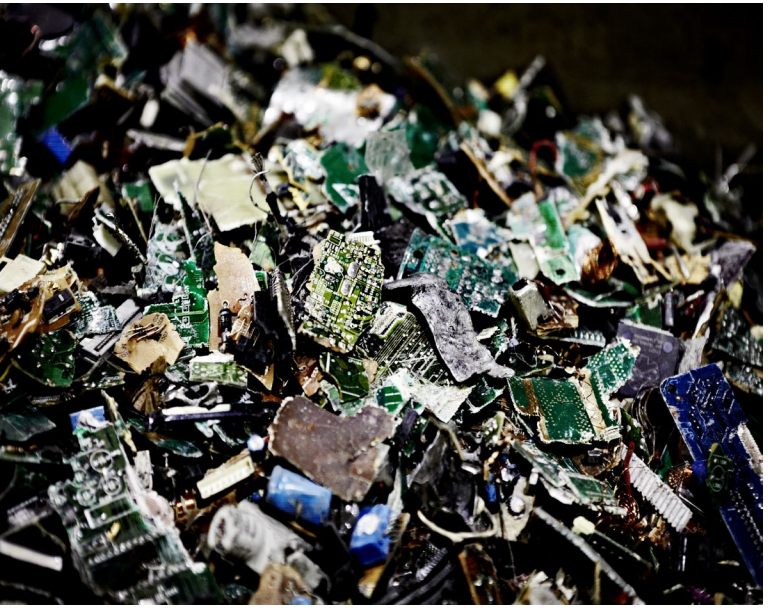
- **Knowledge & technology** to **increase recovery yields** and **extract additional elements** (primary/secondary materials streams)

- **Technology** to ensure the **quality of by-products for use in new applications** (e.g., process control of slag properties / slag composition)

- **Methods & business models** to **use secondary materials or side streams** from **internal processes or across business sectors** to enhance efficiency and recovery of metals.

- **Mechanical & chemical processing** of **complex products** with minimal dissipation of CRMs.

- **Reuse** (compatibility: logistics / product optimization / reintegration into life cycle / safety / efficiency)



(Credits: Boliden)

What are the expected impacts?

- **Sustainable** & **climate neutral** **mineral / metal supply**
- **Optimized processes** for **competitive** & **sustainable processing / refining capacity**
- **Increased**:
  - ✓ **resource efficiency** by **increased minerals** & **metal recovery** (primary/ secondary)
  - ✓ **security of supply** of raw materials
- **Development:**
  - ✓ **circular economy hub in the EU** (cross-sectoral process streams)
  - ✓ **markets for by-products**
- **Maintain energy intensive industries in Europe**
- **Efficient energy** & **water use**
- **Reduced landfill/tailings**
- **Waste:**
  - ✓ **inventories** of depositories and dumps (municipal landfills, domestic waste streams)
  - ✓ **improvement** of their **use** (redirection of waste streams)

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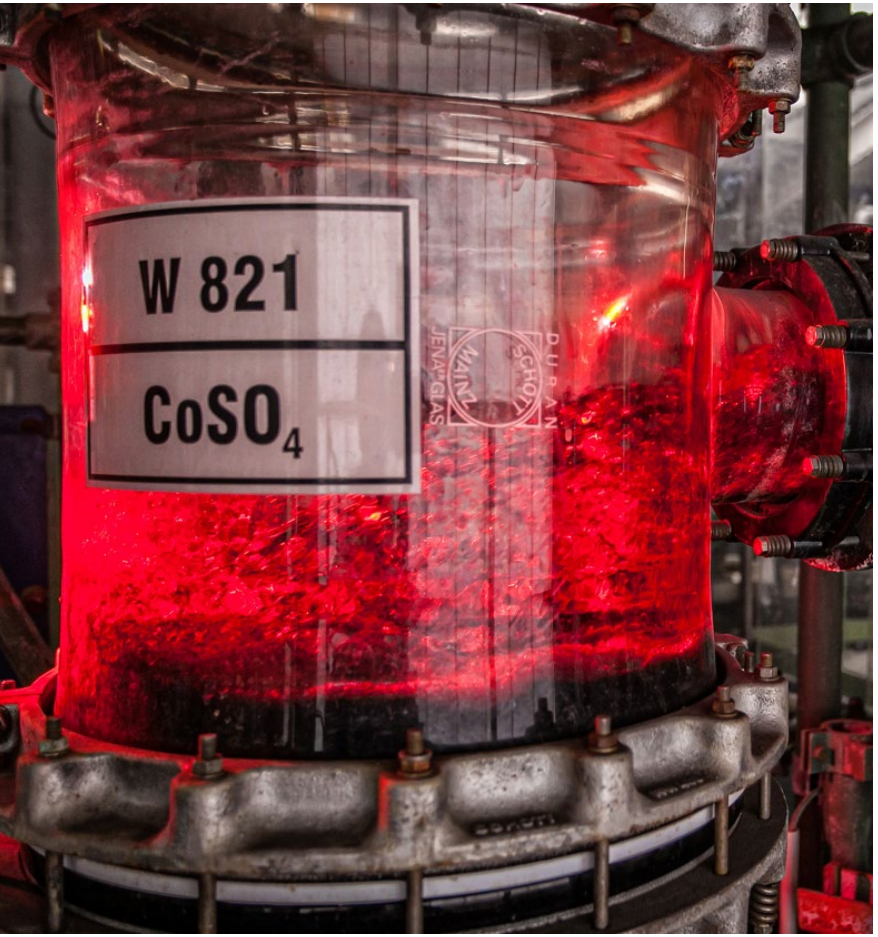
Frontrunners in sustainability – climate neutral and circular metals systems



Cobalt recycling (credit: Nickelhütte Aue)

- **Accelerate technological developments**: mineral processing, metal production & recycling to **stay competitive** while adopting to **climate neutral processes** (goal: **net zero GHG emissions by 2045**)
- **CRMA targets by 2030**: **R&I to develop economically and environmentally viable processes for extracting SRM/CRMs as by-products** from existing mines/waste streams/EOL products, or from advanced exploration projects.

  ⇨ **Access to piloting facilities is key**
- **Long term**: **Metals recovery from new exploration targets and MS Exploration Programs** (increased knowledge base will attract investments)

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Frontrunners in sustainability – environmental & social performance

Wetland restoration (Credit: Kaunis Iron)

High environmental and social performance are key for achieving Social License to Operate and to attract a skilled work force

Examples of **R&I needs** on both **technical- and social science**:

- Water management
- Dam safety and tailings management
- Air emissions management
- Waste management
- Biodiversity status
- Corporate Social Responsibility
- Management of land-use conflict
- Gender equality and diversity
- Safety and needs of workers
- Non-destructive exploration technologies

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Recommendations

European Technology Platform on Sustainable Mineral Resources

The European Union and the Member States cannot rest on its laurels if we want to secure raw materials for our industries:

- **Dramatically strengthen the mineral resource R&I sector**

Create opportunities for research collaboration between industry, SMEs, academia, institute and public authorities

- **Encourage Member States to provide national R&I funding possibilities**

Prioritise a Cofund Partnership on Raw Materials

- **Enable R&I collaboration with other strong mining countries** giving access to a stronger, broader, more mature R&I community (e.g., Australia, Canada, the US)

- **Create instruments and tools** that support weak links along the raw materials value chain R&I gaps along the value chain hamper the build-up of robust value chains

- **Gain leadership** in strategic research in the raw materials ecosystem

Both basic and applied research are need if we are to rebuild a strong, competitive minerals industry

Thank you
for your attention!

Follow us on

Access to the SRIA

Interested in joining? Visit our website (www.etpsmr.org) and contact the Secretariat for more information.

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