Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Estonian Resource Nexus:

Unlocking the collaboration between academia, industry and decision-makers

14 MAY 10–12 CET

Permanent Representation of Estonia to the EU
Rue Guimard 11/13, 1040 Brussels

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Kristel Oitmaa

Carmen Kivistik, PhD

Opening Words by Estonian Research Council Brussels Office

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Moderator

Tony Hand, PhD

Tallinn University of Technology

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Program

10.00 Doors Open

10.30 Opening Words by Kristel Oitmaa and Carmen Kivistik, PhD
Estonian Research Council Brussels Office

10.35 Veiko Karu, PhD, Tallinn University of Technology

10.45 Madalina Ivanica, Deputy Head of Unit on Energy Intensive Industries, Raw Materials and Hydrogen of the DG GROW

11.00 David W. Pennington, PhD, Joint Research Centre, Directorate D – Sustainable Resources

11.20 Dirk Fincke, Aggregates Europe

11.40 Arnout Lugtmeijer, Trisector OÜ

Conclusions by moderator Tony Hand, PhD from the Tallinn University of Technology

12.00 – 13.00 Networking Lunch

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Veiko Karu, PhD

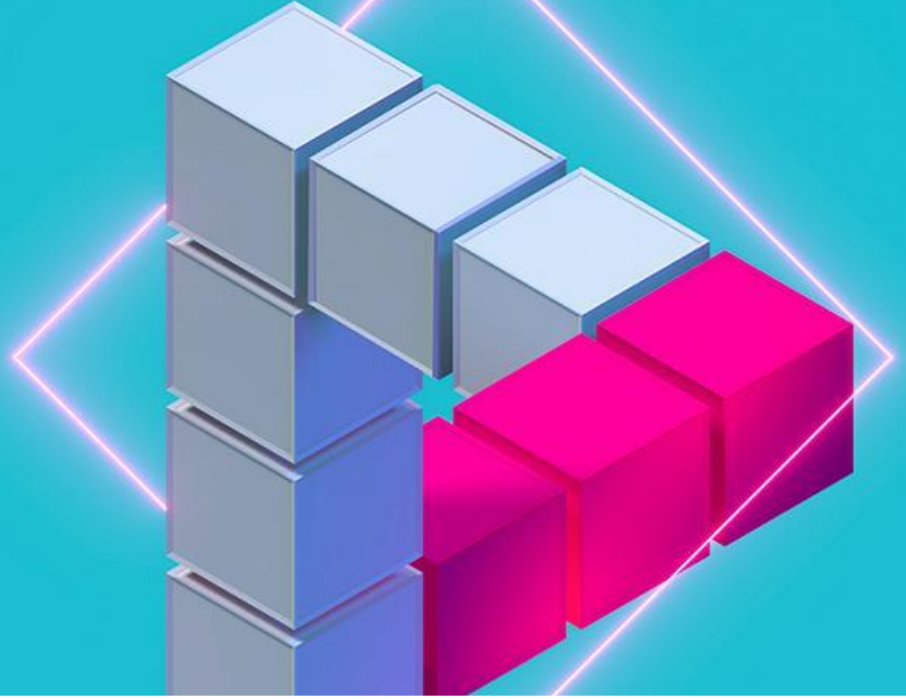
Tallinn University of Technology

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

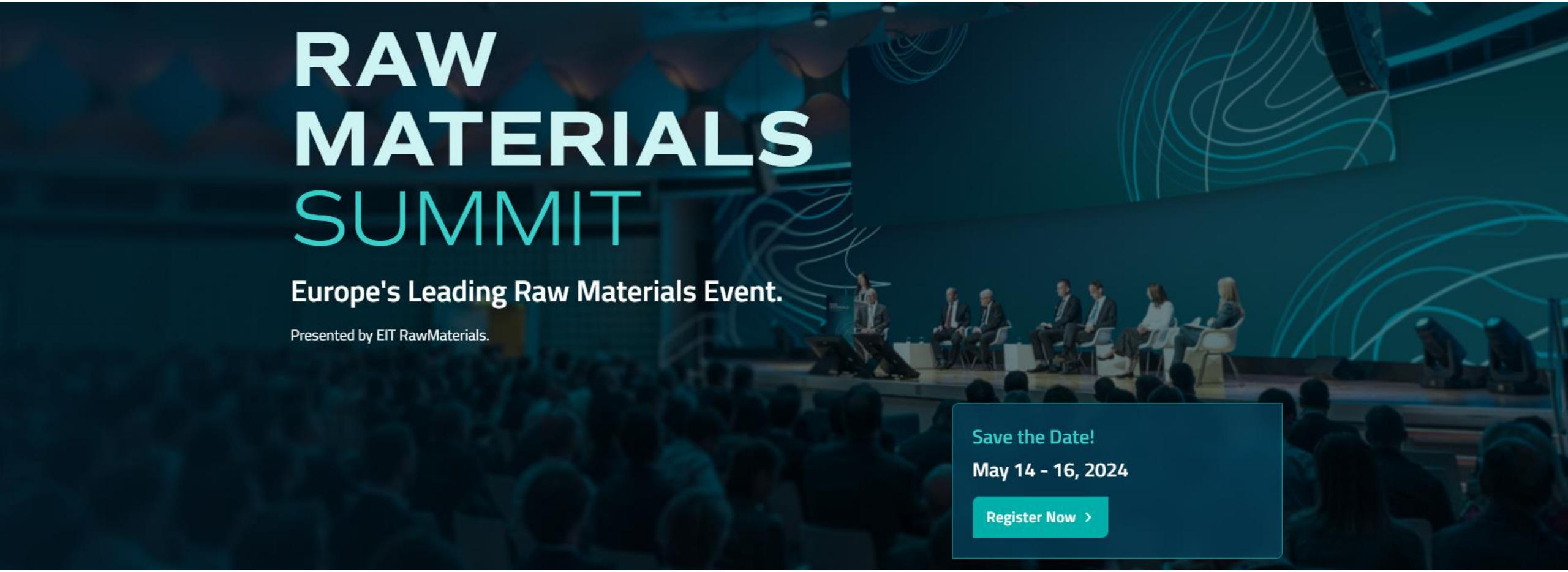
EIT RawMaterials is supported by the EIT, a body of the European Union



ESTONIAN KNOWLEDGE TRIANGLE FOR RAW MATERIALS SECTOR

Veiko Karu
veiko.karu@taltech.ee

TALLINN UNIVERSITY OF TECHNOLOGY



TALLINN UNIVERSITY OF TECHNOLOGY

CRITICAL RAW MATERIALS ACT

Setting benchmarks by 2030 for domestic capacities

The Act sets these benchmarks along the strategic raw materials value chain and for the diversification of the EU supplies:

- at least 10% of the EU's annual consumption for extraction
- at least 40% of the EU's annual consumption for processing
- at least 25% of the EU's annual consumption for recycling
- no more than 65% of the EU's annual consumption from a single third country

➢ a list of strategic raw materials and a list of critical raw materials has been established (the strategic importance is determined based on the relevance of a raw material for the green and digital transition as well as defence and space applications

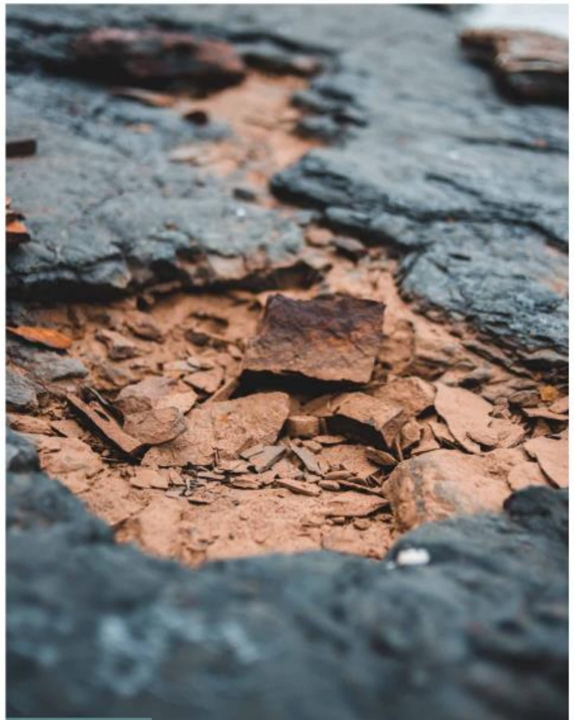
Estonian potential mineral resources

- Estonia has one of the largest phosphorite deposit in Europe
- Estonian phosphorite as a raw material for fertilizers and/or for LFP-batteries also contains REE's, research into the distribution and finding the best technologies for their separation is currently being carried out
- The most important and only industrial-scale rare earth processing plant (NEO Silmet) in Europe is in Estonia
- Neo's new rare earth permanent magnet facility, opening soon

Black shale

Phosphate rock

TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

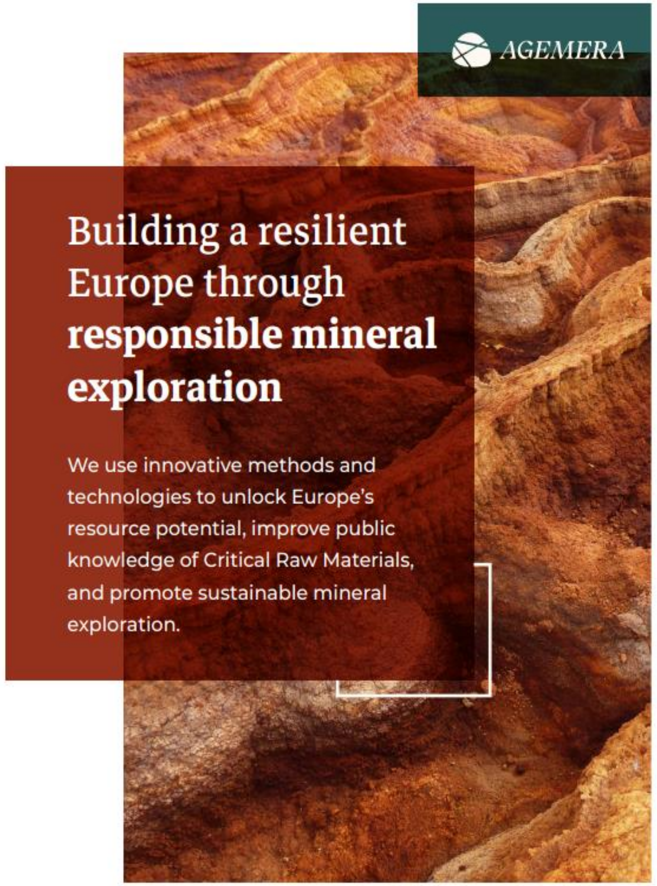


FOLLOW US

@agemera_eu

AGEMERA EU Project

Funded by the European Union



WHO WE ARE

UNIVERSITY OF OULU · LAPIN YLIOPISTO UNIVERSITY OF LAPLAND · University of Zagreb Faculty of Mining, Geology and Petroleum Engineering · TAL TECH · Geological Institute BAS · CSIC · TU Bergakademie Freiberg · KGHM CUPRUM · LITHICA · radai · MuoN solutions · GEONARDO · OPT/NET · LATITUDE COBALT · BAUXITE MINES POSUSJE · matsa · KGHM

WHAT WE DO

We use **innovative and non-invasive methods* of surveying** across 4700 km² in 6 countries in Europe and one in Africa to assess the current resource potential and identify new areas of exploration.

We survey local communities' concerns and hopes on mineral exploration and compile the generalised and anonymised results into an **open-access database**.

We create **educational packages** about Critical Raw Materials to raise awareness of their crucial role in our modern world.

*Passive seismics, multi-sensing drone geophysics, and cosmic-ray muography.

TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

FULL NAME

AGEMERA: Agile Exploration and Geo-modelling for European Critical Raw materials

FUNDING PROGRAMME

HORIZON Research and Innovation Actions

BUDGET

€ 7.5 Million

DURATION

01.08.2022 – 31.07.2025

COORDINATOR

University of Oulu


TAL
TECH
TALLINN UNIVERSITY
OF TECHNOLOGY

EIT COMMUNITY

EIT Food
Building a future-fit food system that produces healthy and sustainable food for all

EIT Digital
Driving Europe's digital transformation

EIT Culture & Creativity
Transforming Europe's cultural and creative sectors and industries

EIT Climate-KIC
Working to accelerate the transition to a zero-carbon economy

EIT Health
Giving European citizens greater opportunities to enjoy a healthy life

EIT InnoEnergy
Achieving a sustainable energy future for Europe

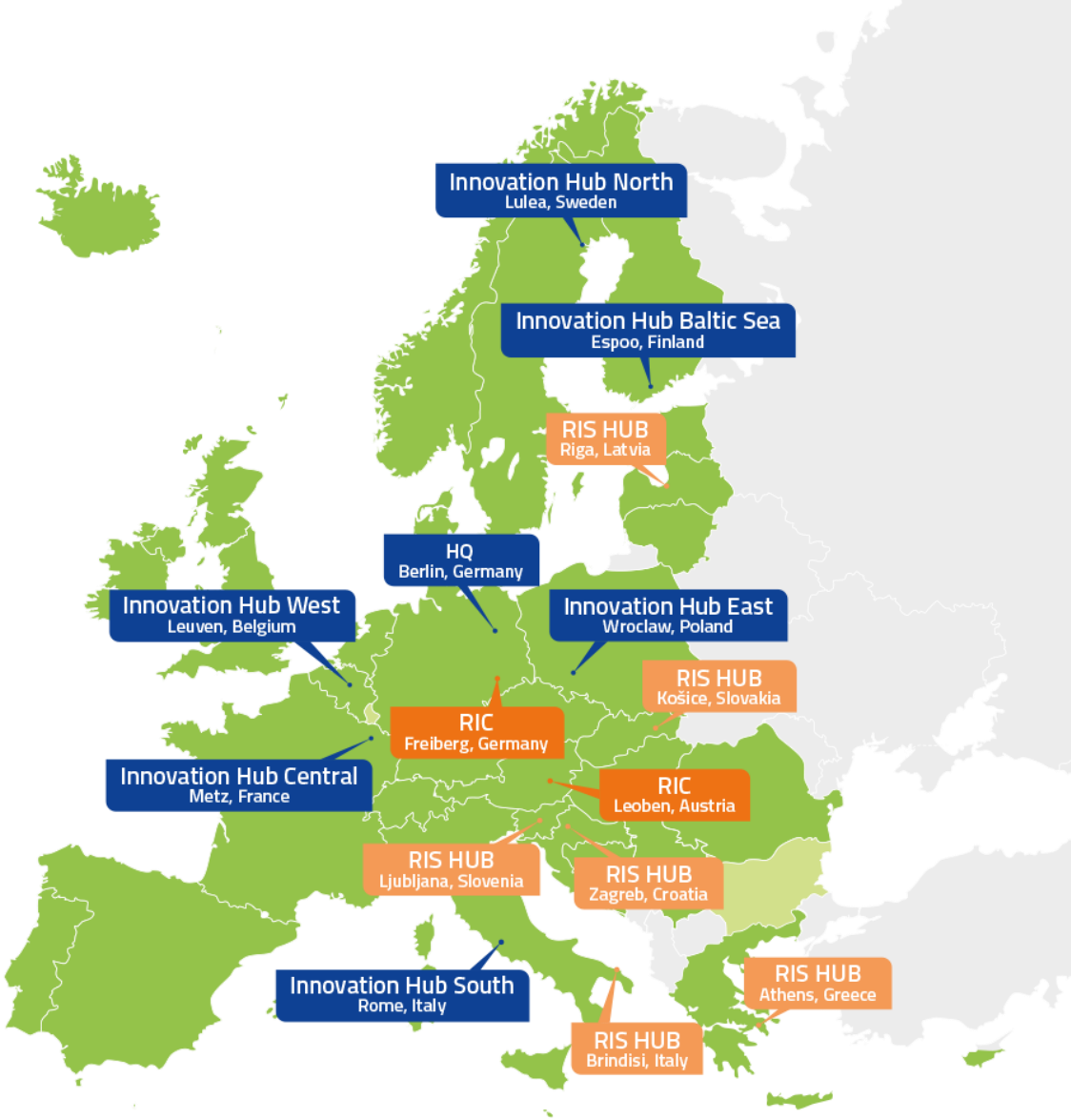
EIT Manufacturing
Bringing European manufacturers together

EIT RawMaterials
Developing raw materials into a major strength for Europe

EIT Urban Mobility
Mobility for more liveable urban spaces

A PAN-EUROPEAN PARTNER NETWORK

- Coverage of the entire raw materials value chain
- World's largest community in the raw materials sector
- Over 120 core and associate partners and 180+ project partners
- 22+ countries
- 6 Innovation Hubs across Europe
- 8 Regional Innovation Hubs/Centers
- Headquarter in Berlin, Germany



Countries covered by EIT RawMaterials
EU countries
Innovation Hub
RIC (Regional Innovation Center)
RIS HUB (Regional Innovation Scheme)

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

EIT RAWMATERIALS INNOVATION THEMES

EXPLORATION
AND RAW MATERIALS RESOURCE ASSESSMENT

MINING
IN CHALLENGING ENVIRONMENTS

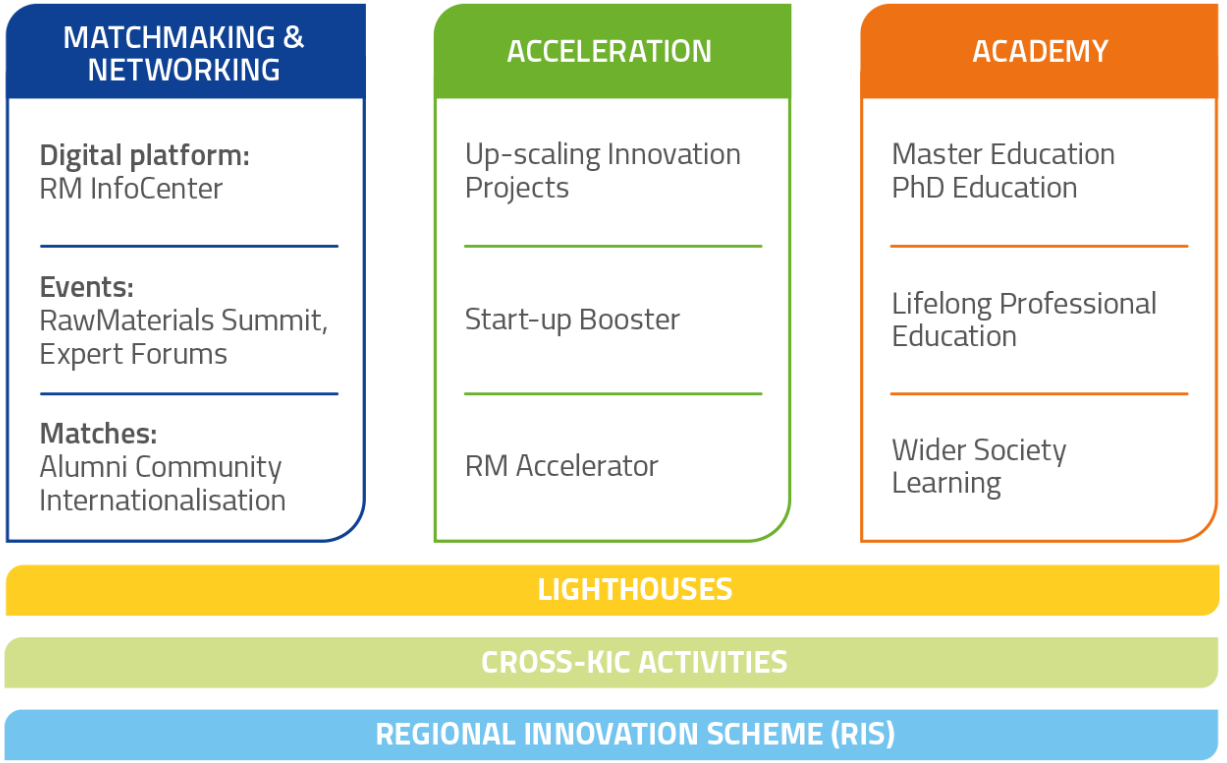
PROCESSING
INCREASED RESOURCE EFFICIENCY IN MINERAL AND METALLURGICAL PROCESSES

RECYCLING
AND MATERIAL CHAIN OPTIMISATION OF END-OF-LIFE PRODUCTS

SUBSTITUTION
OF CRITICAL AND TOXIC MATERIALS IN PRODUCTS FOR OPTIMISED PERFORMANCE

CIRCULAR ECONOMY
DESIGN OF PRODUCTS AND SERVICES FOR THE CIRCULAR ECONOMY

INNOVATION, EDUCATION AND ENTREPRENEURSHIP ACTIVITIES



TalTech is core member of the EIT Raw Materials network
Since 2015, have participated in 44 projects with more than 3,5 MEUR

RawMaterials Hub
Regional Center Baltic

RIGA TECHNICAL UNIVERSITY

kaunas university of technology

TAL TECH

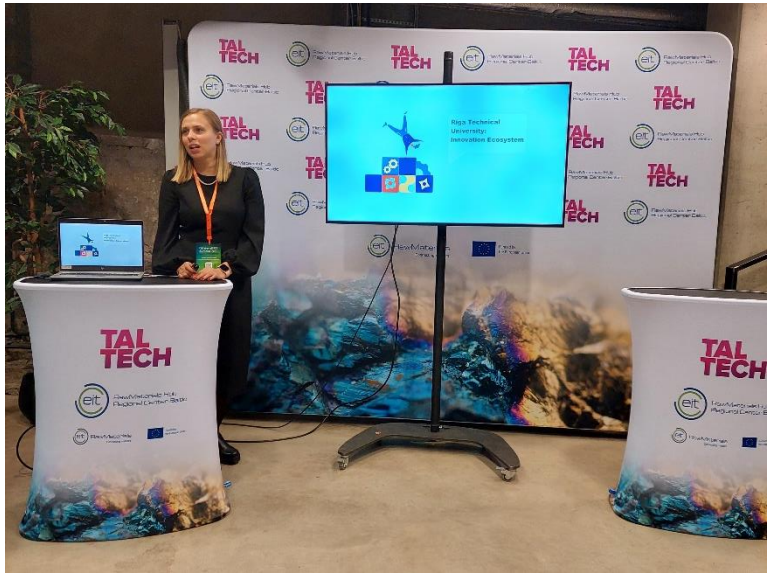
EIT RawMaterials is supported by the EIT, a body of the European Union

PHD SCHOOLS

With the collaboration:

- RIS HUB Baltic
- Riga Technical Uni
- Kaunast Technical Uni
- Callio Lab
- Oulu Mining Schools
- Oulu University

Future PhD candidate
Internships
Deep Learning Skills
Entrepreneurship



EIT RAWMATERIALS INNOVATION THEMES

- **Exploration** and raw materials resources assessment
- **Mining** in challenging environments
- Increased **resource efficiency** in mineral and metallurgical processes
- **Recycling** and material chain optimisation for end-of-life products
- **Substitution** of critical and toxic materials in products for optimised performance
- Design of products and services for the **circular economy**

GREEN TRANSITION IN TALTECH

- In the field of climate and energy savings, we cooperate with the private and public sectors and international networks.
- We integrate the principles of sustainable development and circular economy into curricula as well as other fields and activities.
- Our campus is the test centre of the city of the future.
- Climate neutral university by 2035.

CIRCULAR ECONOMY CORE LAB

- CECL is a **cooperation platform** for the **circular economy** of the university and an instrument for **coordinating innovation** and exchanging information between disciplines in the circular economy.
- The core lab is a single point of contact for finding the competencies and services of the circular economy of the technical university and for the smooth implementation of various forms of cooperation.

Sustainable technologies
- Valuation of resources
- Circular economy of secondary raw materials
- Valuation of biomass
- CO2 valorisation

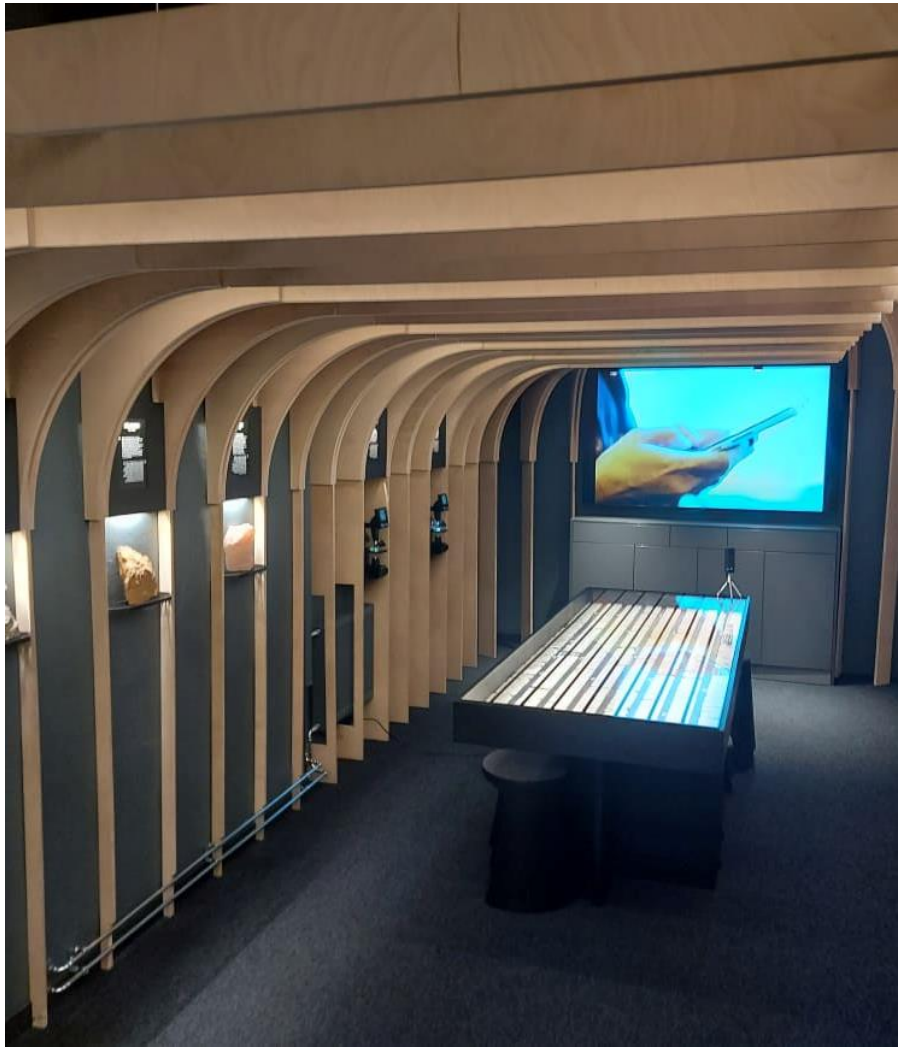
A sustainable society
- Sustainable entrepreneurship
- A smart society

- Contact: Karin Käär, karin.kaar@taltech.ee

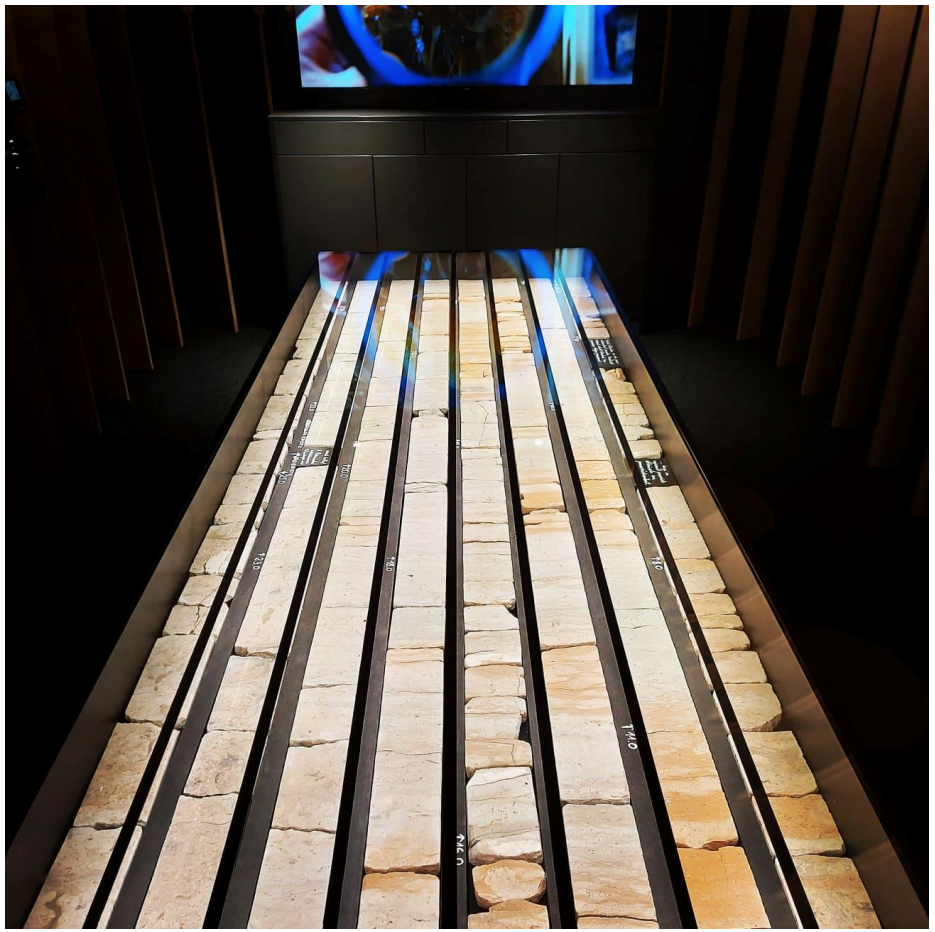
TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

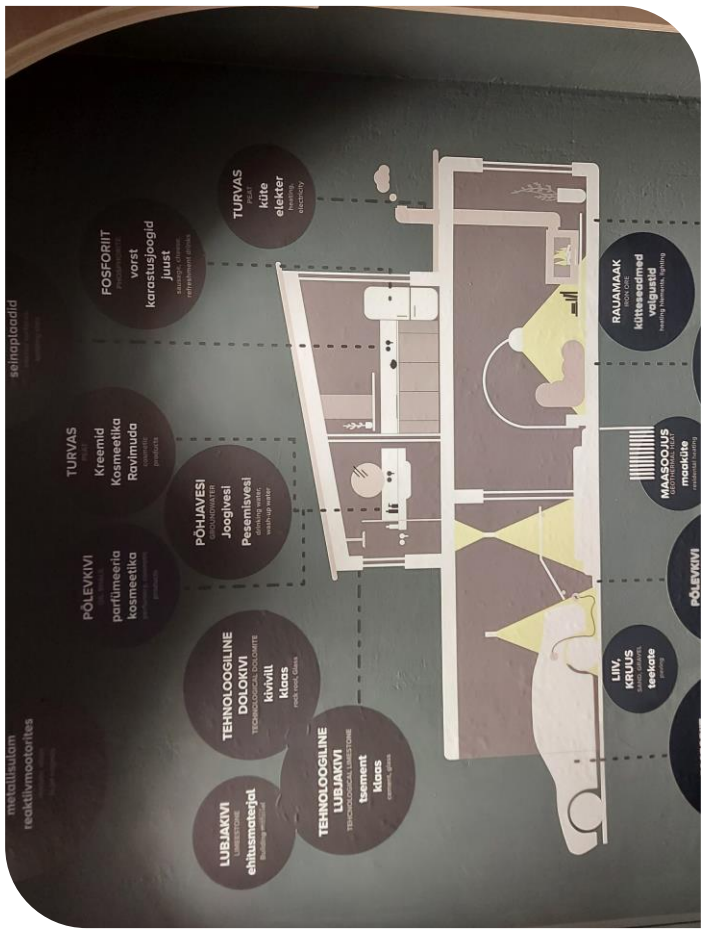
GreenRockLab

- Coworking space
- Entrepreneurship
- Group meetings
- Business creation
- Thematic seminars
- Matchmaking
- Networking events



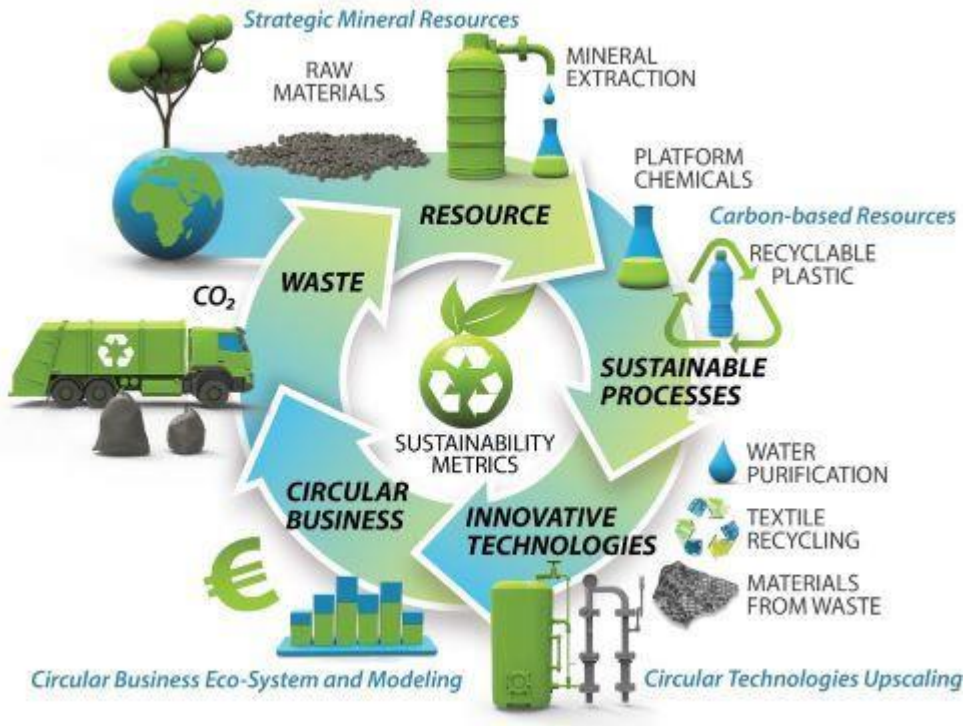
GreenRockLab





TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

CENTRE OF EXCELLENCE IN CIRCULAR ECONOMY OF STRATEGIC MINERAL AND CARBON-BASED RESOURCES (SOURCES)

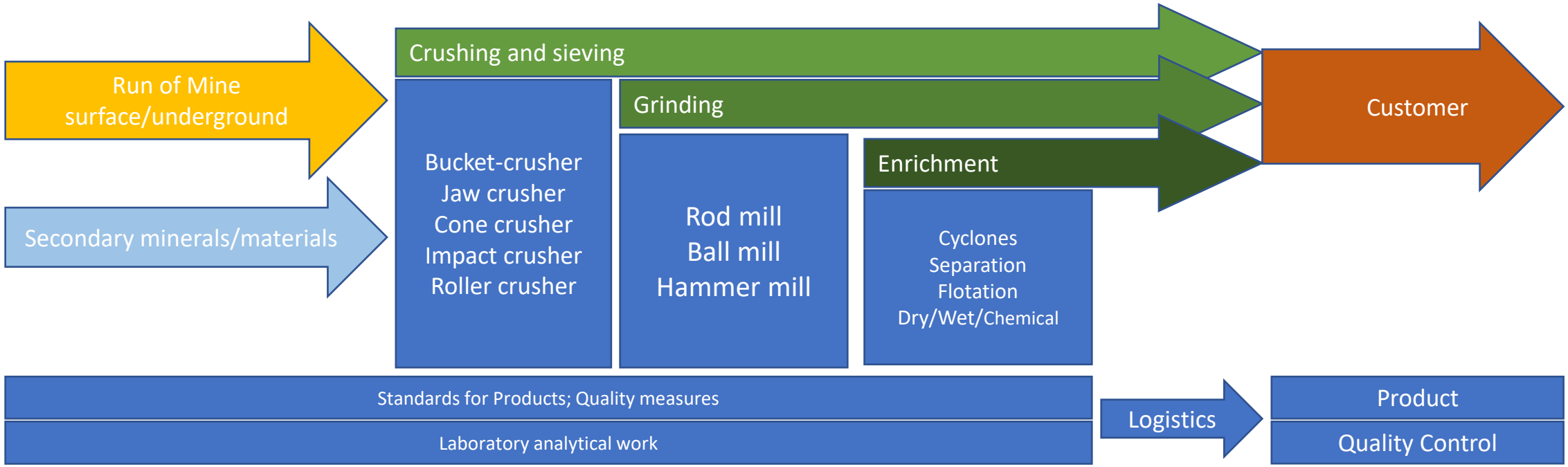


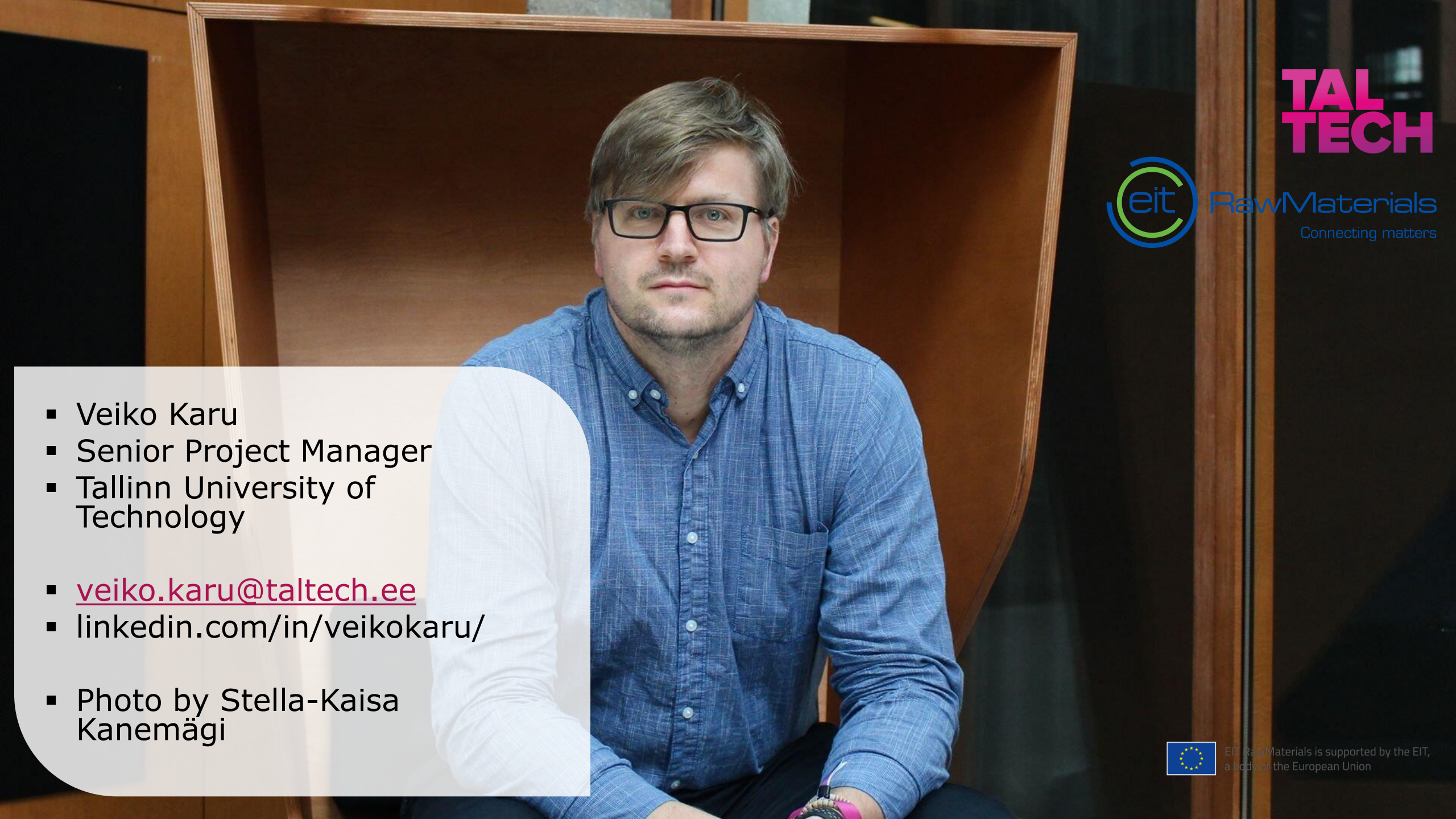
- Centre of Excellence (CoE) focuses on fostering innovation in resource efficiency, promoting circular economy practices, utilising local resources, ensuring safe material circulation, and educating researchers to reduce environmental impacts.
- It centers around four key areas:
  - Strategic Mineral Resources (SMR),
  - Carbon-Based Resources (CBR),
  - Circular Technologies Upscaling (CTU),
  - Circular Business Eco-System and Modeling (CBEM).
- The SMR group maps critical materials in waste streams, including renewables, for extraction and reuse while minimizing hazardous waste.
- The CBR group develops eco-friendly pathways for essential chemicals and plastics, also assessing their environmental impact.
- The CTU group pioneers waste reduction and recycling methods for aqueous and solid waste, incl. water purification.
- The CBEM group analyses sustainable business ecosystems and value chains.

- This CoE's interdisciplinary approach will benefit both Estonia and Europe by advancing circular economy.
- https://taltech.ee/en/sources

TAL TECH | TALLINN UNIVERSITY OF TECHNOLOGY

MINERAL VALUE CHAIN OF PRODUCTION





- Veiko Karu
- Senior Project Manager
- Tallinn University of Technology

- veiko.karu@taltech.ee
- linkedin.com/in/veikokaru/

- Photo by Stella-Kaisa Kanemägi

EIT RawMaterials is supported by the EIT, a body of the European Union

THANK YOU!

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Madalina Ivanica

Deputy Head of Unit on Energy Intensive Industries, Raw Materials and Hydrogen of the DG GROW

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

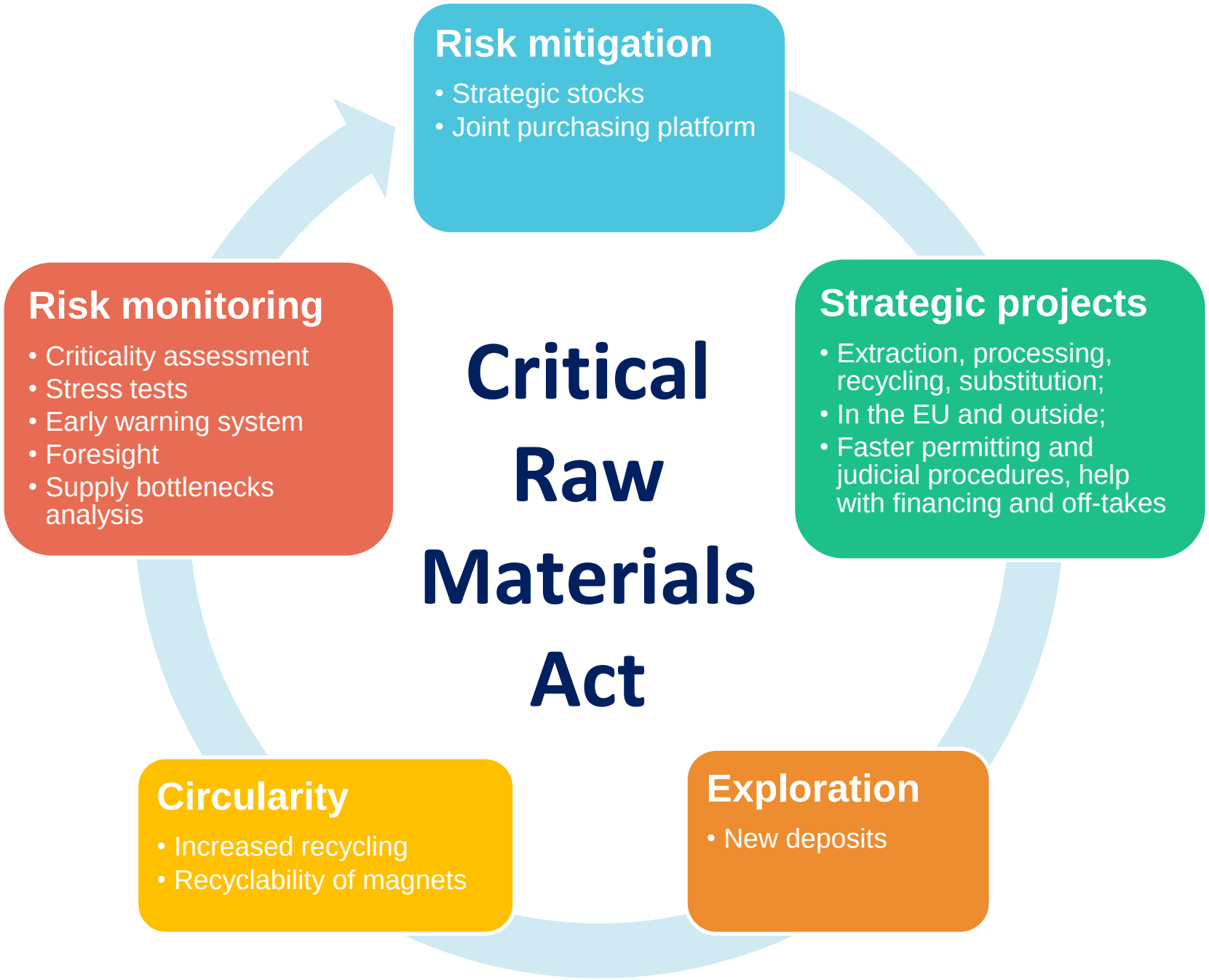
Horizon Europe Raw Materials Funding Opportunities

EU Research & Innovation for sustainable and efficient raw materials value chains

Brussels14-05-2024

Dimitrios BILIOURIS, Project Adviser, Raw Materials Sector, B.3.1 HaDEA

Critical Raw Materials Act



PRIORITIES

CRITICAL RAW MATERIALS

- **Whole EU economy**

STRATEGIC RAW MATERIALS (SRM)

- **Key for strategic technologies (green, digital, defence and space)**

2030 BENCHMARKS

SRM supply security

- extraction capacity >**10%**
- processing capacity >**40%**
- recycling capacity >**25%**

Diversification of supply

- **<65%** from a single third country.

European Commission

Critical and Strategic Raw Materials 2023

34 RAW MATERIALS DEFINED as CRITICAL and 17 as STRATEGIC

- Antimony
- Arsenic
- **Bauxite/Aluminium**
- Baryte
- Beryllium
- **Bismuth**
- **Boron**
- **Cobalt**
- Coking Coal
- **Copper**
- Feldspar
- Fluorspar
- **Gallium**
- **Germanium**
- Hafnium
- Helium
- **Heavy Rare Earth Elements**
- **Light Rare Earth Elements**
- **Lithium**
- **Magnesium**
- **Manganese**
- **Graphite (natural and synthetic)**
- **Nickel – battery grade**
- Niobium
- Phosphate rock
- Phosphorus
- **Platinum Group Metals**
- Scandium
- **Silicon metal**
- Strontium
- Tantalum
- **Titanium metal**
- **Tungsten**
- Vanadium

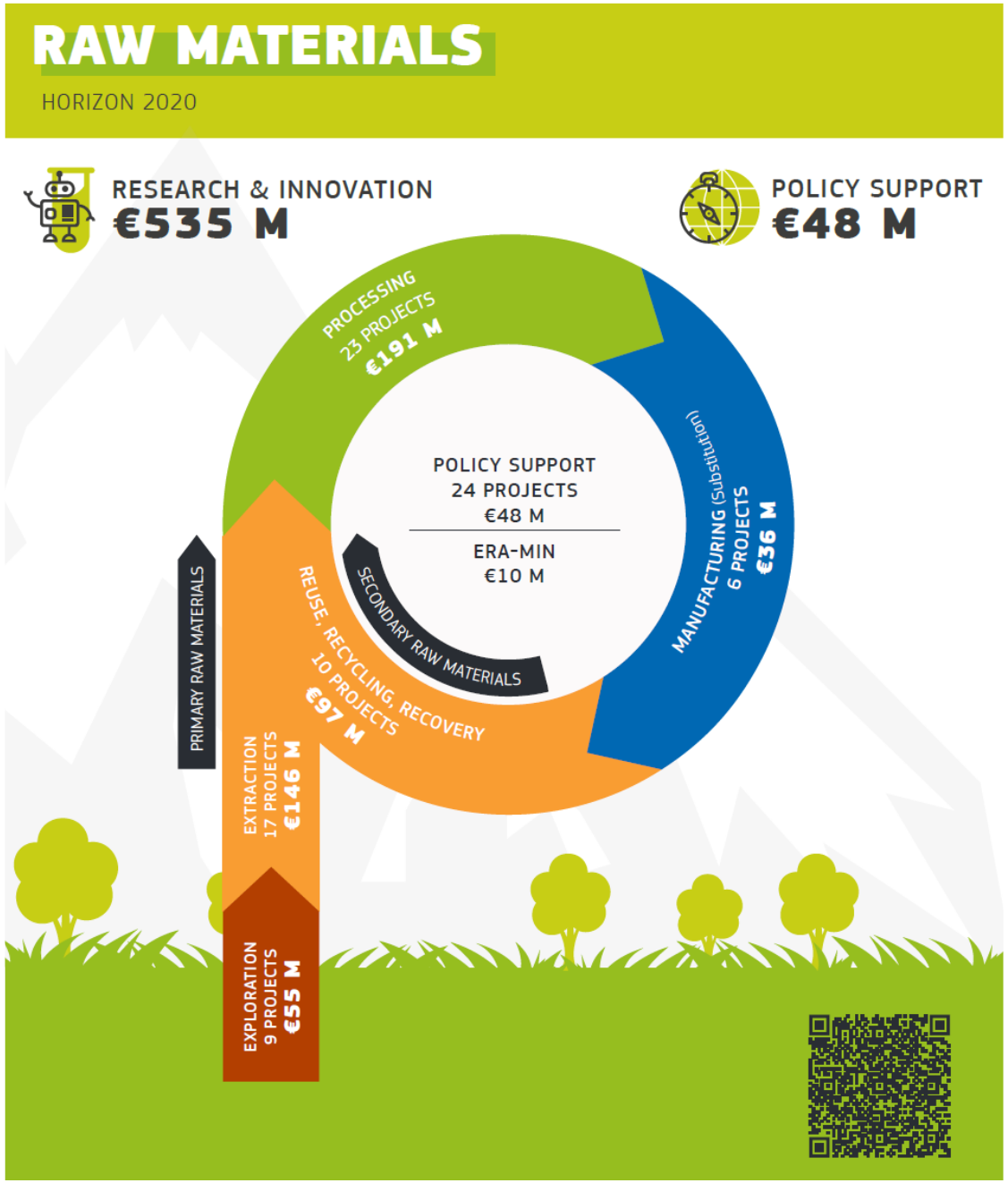
European Commission

Raw materials R&D funding

Funding opportunities in the entire value chain for the sustainable supply of raw materials (**exploration, extraction, processing, reuse, recycling & recovery, substitution)**

91 projects under H2020 out of which 31 are still managed by HaDEA

over €1 bn total EU funding
under **Horizon 2020** (2014-2020) and **Horizon Europe** (2021-2024, estimated budget for 23-24)

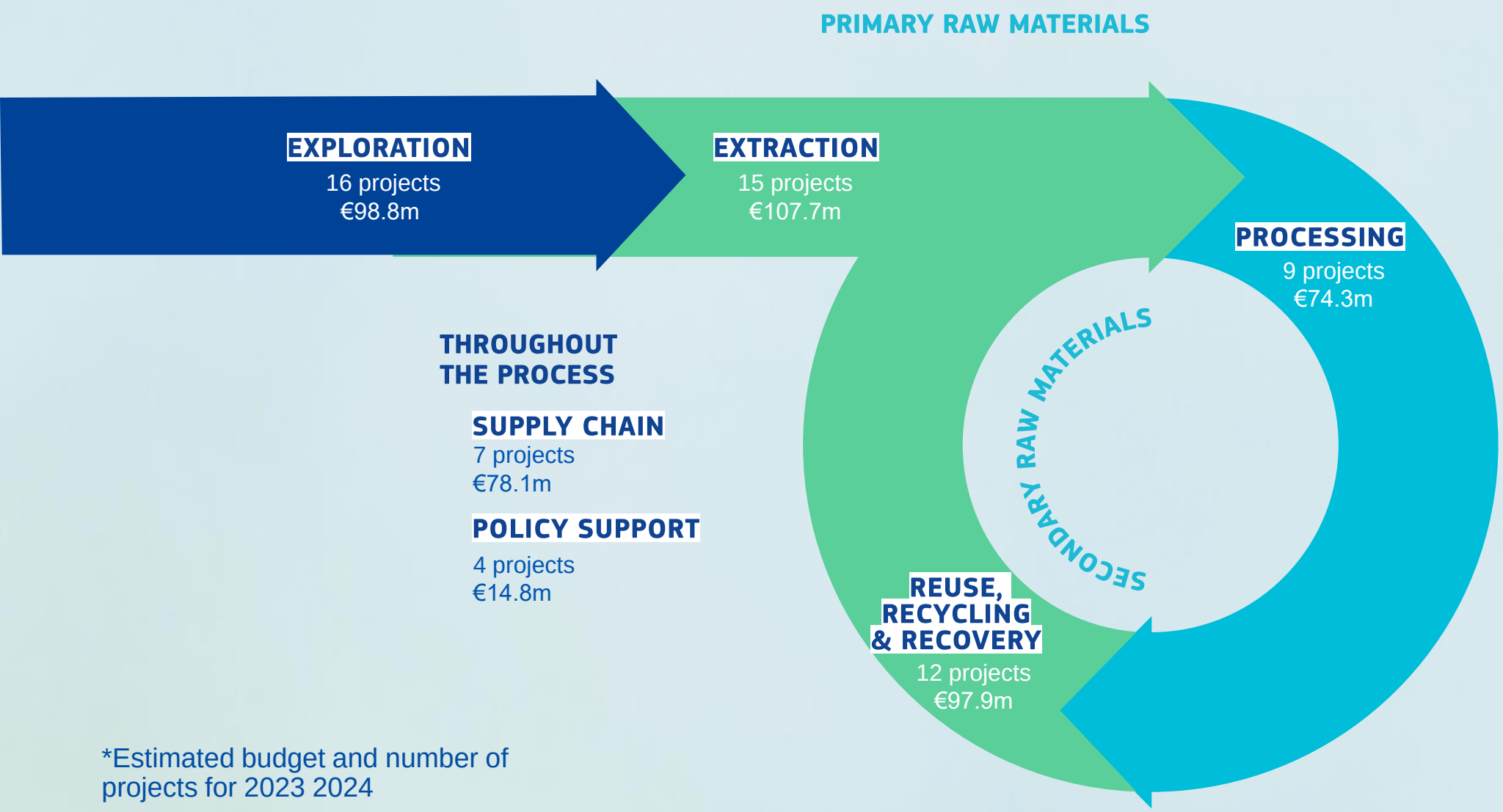


HE Overview calls raw materials 2021-2024*

TOTAL BUDGET ALLOCATION FOR RAW MATERIALS

Research & innovation €456.7m

Policy support €14.8 m



*Estimated budget and number of projects for 2023 2024

European Commission

Cluster 4 Digital, Industry and Space – Raw materials part

Call HORIZON-CL4-2024-RESILIENCE-01

Opening: 19 Sep 2023, Deadline(s): 07 Feb 2024 (CLOSED)

Last call example

- HORIZON-CL4-2024-RESILIENCE-01-01: **Exploration** of critical raw materials in deep land deposits (RIA) 20M
- HORIZON-CL4-2024-RESILIENCE-01-04: Technologies for **processing and refining** of critical raw materials (IA) 22M
- HORIZON-CL4-2024-RESILIENCE-01-08: **Rare Earth and magnets** innovation hubs (IA) 32M
- HORIZON-CL4-2024-RESILIENCE-01-10: Addressing **due diligence** requirements in raw materials supply chains (CSA) 2M
- HORIZON-CL4-2024-RESILIENCE-01-11: Technologies for **extraction and processing** of critical raw materials – focused on strategic partnerships with Canada and Ukraine (IA) 15M

European Commission

Infoday on Raw materials - Horizon call 2025 on 9 Dec 2024

European Commission

Thank you

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

David W. Pennington, PhD

Joint Research Centre

Directorate D – Sustainable Resources

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

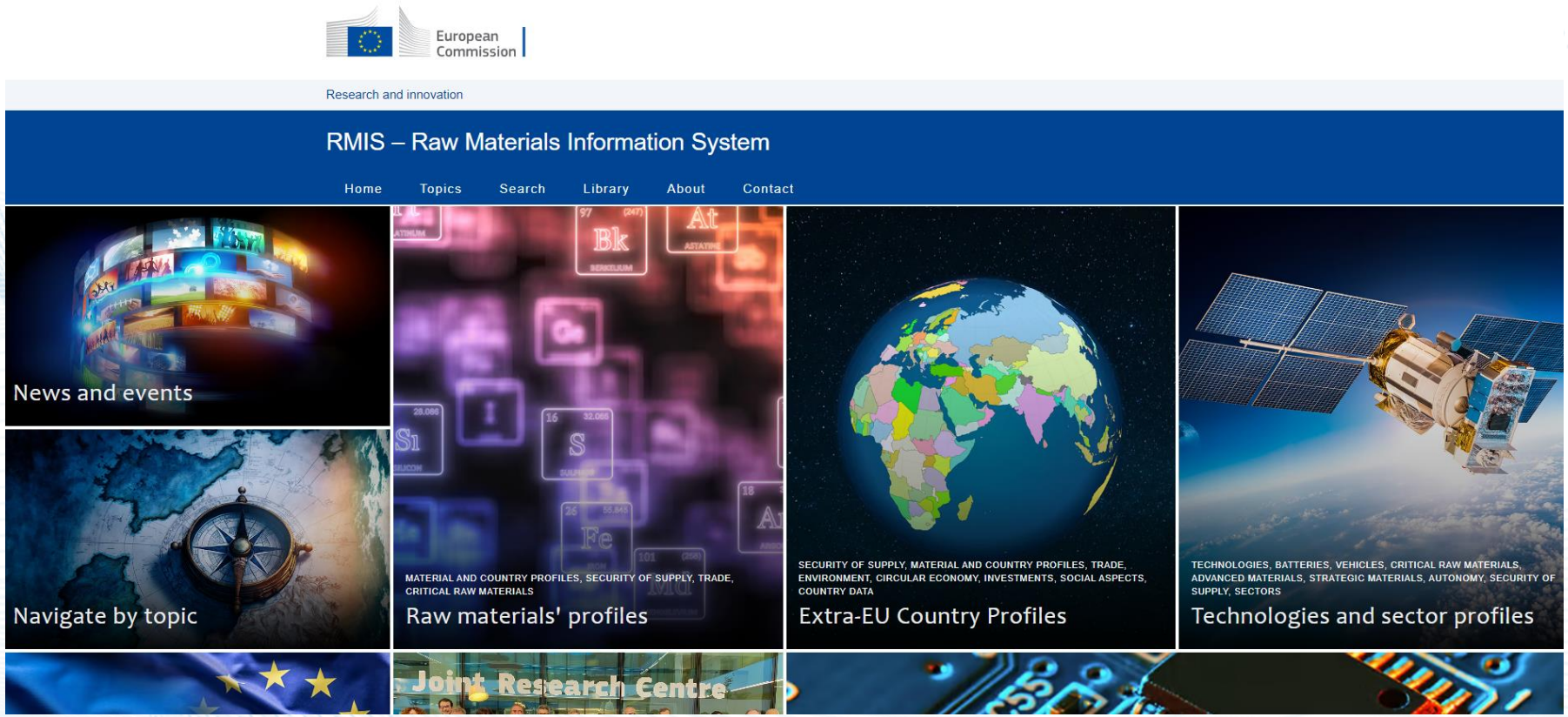
EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

PERMANENT REPRESENTATION OF ESTONIA TO THE EU

Introduction to https://rmis.jrc.ec.europa.eu/



Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Dirk Fincke

Aggregates Europe

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Estonian Resource Nexus: Unlocking the collaboration between academia, industry and decision-makers

Dirk Fincke, Secretary General, Aggregates Europe - UEPG
Permanent Representation of Estonia to the EU, Rue Guimard 11/13, 1040 Brussels

Aggregates Europe - UEPG represents the European Aggregates Industry

by far the largest non-energy extractive industry

The European [EU28+EFTA, 2018] aggregates demand is

3 billion

tonnes per year,
representing an annual turnover estimated at €15-€20 billion.

The European [EU+EFTA, 2018] average demand for aggregates is almost

6 tonnes

per capita per year.

The European Aggregates Industry comprises

15 000

companies (mostly SMEs),

producing aggregates at

26 000

sites across Europe,

with just on

200 000

people employed
(including contractors).

Antonis Antoniou Latouros
President
Aggregates Europe - UEPG

UNEP REPORT ON SAND & SUSTAINABILITY

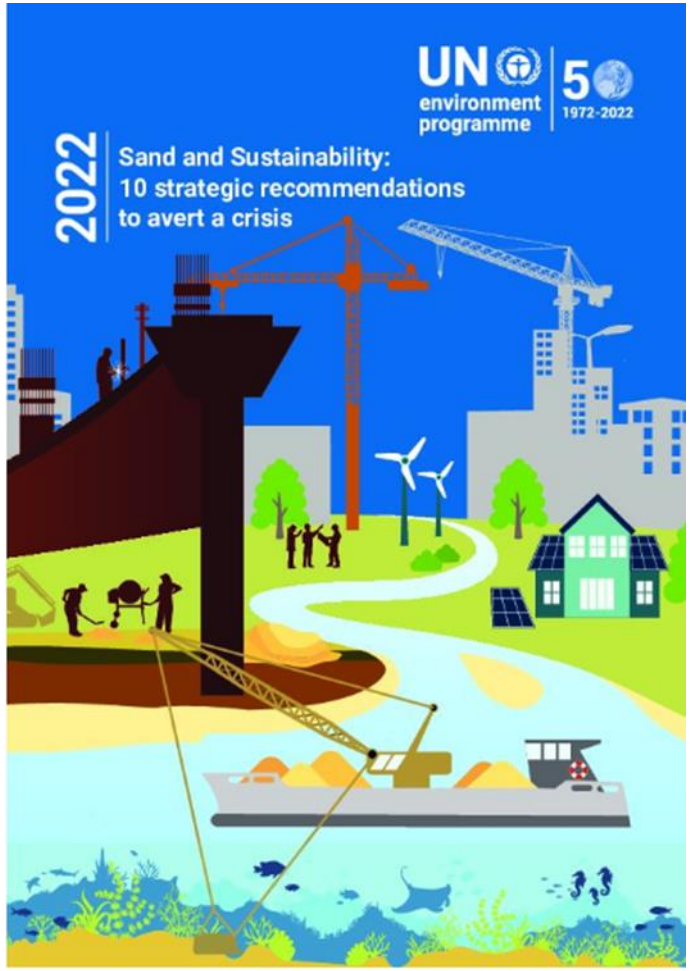


Table 3 : 10 Recommendations to Avert a Crisis	
Recommendation 1	**Recognise sand as a strategic resource** that delivers critical ecosystem services and underpins the construction of vital infrastructure in expanding towns and cities globally.
Recommendation 2	**Include place-based perspectives for just sand transitions**, ensuring the voices of all impacted people are part of decision-making, agenda-setting and action.
Recommendation 3	**Enable a paradigm shift to a regenerative and circular future**.
Recommendation 4	**Adopt strategic and integrated policy and legal frameworks** horizontally, vertically and intersectionally, in tune with local, national, and regional realities.
Recommendation 5	**Establish ownership and access to sand resources** through mineral rights and consenting.
Recommendation 6	**Map, monitor and report sand resources** for transparent, science-based and data-driven decision-making.
Recommendation 7	**Establish best practices and national standards, and a coherent international framework**
Recommendation 8	**Promote resource efficiency & circularity** by reducing the use of sand, substituting with viable alternatives and recycling products made of sand when possible.
Recommendation 9	**Source responsibly** by actively and consciously procuring sand in an ethical, sustainable, and socially conscious way.
Recommendation 10	**Restore ecosystems and compensate for remaining losses** by advancing knowledge, mainstreaming the mitigation hierarchy, and promoting nature-based solutions.

Why essential raw materials? An example:

"Manufacturing wind turbines and components requires stable, secure supply and cost-competitive supply of raw materials such as concrete, iron, and steel that make up more than 90% of the mass of a turbine, including the foundation." Wind Europe, Nov 2022

Our colleagues from the German Aggregates Federation (MIRO) stated in the German Parliament during a hearing in 2023:

1. One 3-megawatt wind turbine requires 1,300 t aggregates for the base plus 700 t for the tower;
2. The German Government plans to build 30 wind turbines per week to achieve the "Energiewende", i.e. 1,560 wind turbines per year;
3. That means more than 3,000,000 t of aggregates per year for the wind turbines only (not counting for infrastructure), or the total annual average production of an additional 20-30 aggregates sites, not yet permitted.
4. And we need access now!

Meanwhile in the offices in charge of land use planning and permitting procedures:

Good news from Brussels: From now on focus on critical and strategic raw material projects.

What about all the other essential raw materials?

"Supply issues of sand?
We have it everywhere!"

"If not critical nor strategic,
why bothering?"

"Essential raw materials could
be covered at national level."

"If not accessible in one country, it
could be imported from another!?"

EUROPEAN CRITICAL RAW MATERIALS ACT

WWF

"… the Commission's proposals presented today are a blunt instrument that could do a lot of unnecessary damage along the way, especially to nature and biodiversity."
Source: https://www.wwf.eu/?9452966/PR-NZIA-CRMA-Proposal

Friends of the Earth

"The EU's new Critical Raw Materials Regulation fails to tackle rampant overconsumption and deliver justice for communities facing mining"
Source: https://friendsoftheearth.eu/press-release/new-eu-raw-materials-plans-fail-to-deliver-justice/

The European Environmental Bureau

"EU's Critical Raw Materials Act: A Mixed Bag of Aspirations and Shortcomings"
Source: https://eeb.org/eus-critical-raw-materials-act-2/

THE ESSENTIAL RAW MATERIALS COALITION

EUROPEAN CRITICAL RAW MATERIALS ACT

At the EU Sectorial Social Dialogue Committee for the Extractive Industries we reviewed the provisions of the Critical Raw Materials Act (CRMA) and cleared up some wide-spread claims.

1. The CRMA is a step in the right direction!
👉 Sure, but most raw materials needed for the green & digital transition are left out and behind.

2. The CRMA will have positive side effects for all the other raw materials!
👉 Absolutely unclear and the possibility of negative side effects is given with competent authorities for permitting and land-use planning already heavily charged and are now requested to prioritise.

3. The CRMA has raised the importance of raw materials for our economy!
👉 Yes, but the debate and most of the EU events are exclusively around critical raw materials, thus, addressing a fraction of the needed supply.

Europe needs all raw materials, not a selection.

UEPG AGGREGATES EUROPE

EUROPEAN CRITICAL RAW MATERIALS ACT

Next steps for The Essential Raw Materials Coalition

- Observe the implementation of the Critical Raw Materials Act and the impacts on essential raw materials
- How to ensure sustainable supply of non-critical/non-strategic raw materials if not through the Critical Raw Materials Act?
- Gather fact and figures on the risk of supply for essential raw materials before they qualify as critical
- Exchange on strategy between partners of the Coalition

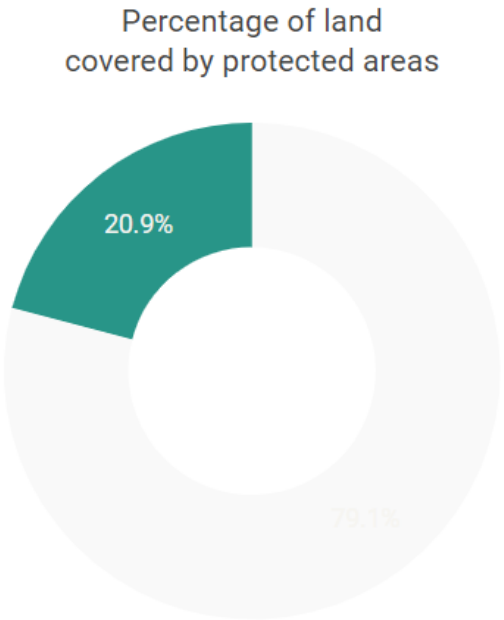
Message: The EU Green Deal and its objectives need all raw materials!

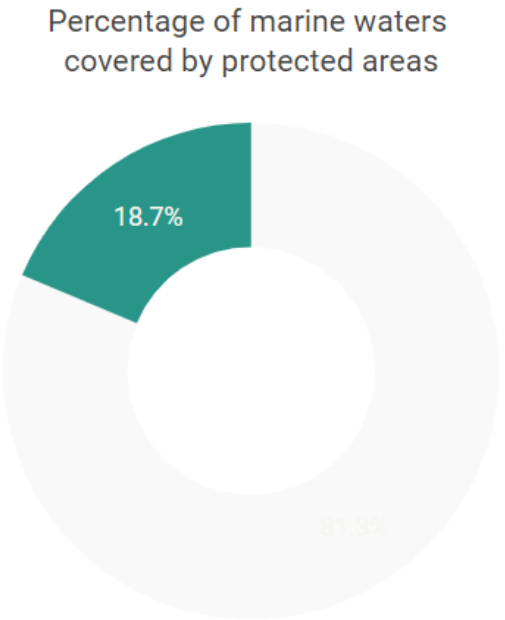
DESIGNATION OF PROTECTED AREAS

- **BDS 2030: main targets**
  - Expansion of **protected areas** to at least 30% of EU's land and seas;
  - **Strict protection** of at least 10% of EU's land and seas;
  - Development of **legally binding nature restoration** targets (cf. Nature Restoration Law);
  - Development of a Trans-European nature network

DESIGNATION OF PROTECTED AREAS

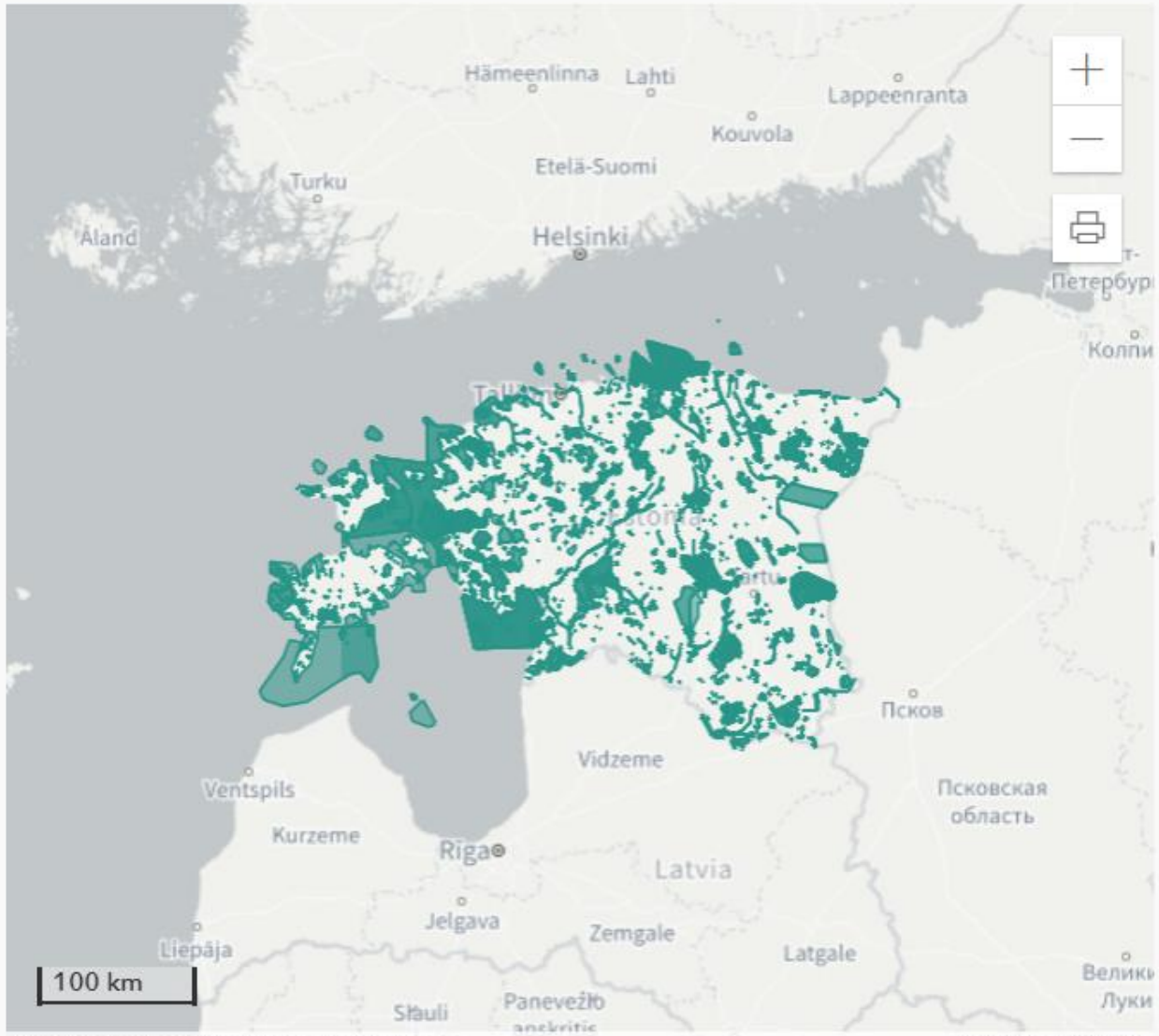
- **Lack of transparency & stakeholders' involvement** regarding the designation process by Member States of protected and strictly protected areas.
- Letter to Commissioner Sinkevičius to raise the issue and meeting with Commissioner's cabinet.



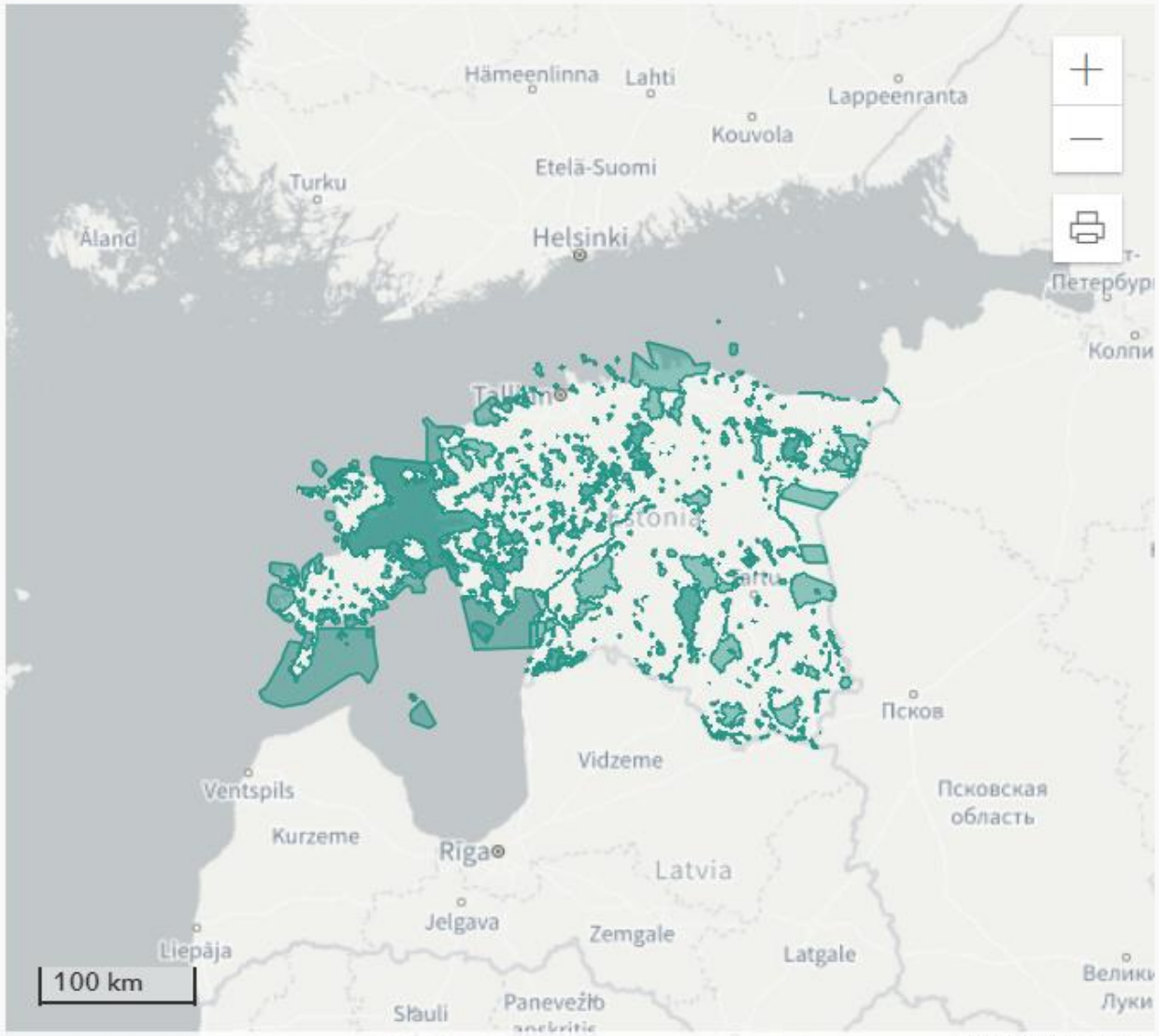


Spatial distribution of protected areas network

Protected areas designated under national laws



Designated sites in the Natura 2000 network



EU SOIL MONITORING DIRECTIVE

- Key objective is **to address key soil threats**, it requires Member States **to monitor soils and obliges them to take measures to improve soil health**.
- Agenda:
  - Publication by the Commission proposal 05/07/2023
  - Parliament & Council debate
  - AGRI opinion voted on 13 February 2024
  - ENVI on 11 March 2024
  - European Parliament plenary vote on 10 April 2024
  - Debate in Council on the impact of mining/quarrying

Your voice in Europe!

UEPG
AGGREGATES EUROPE

Aggregates Europe - UEPG
Square de Meeûs 40, 1000 Brussels
secretariat@aggregates-europe.eu
EU Transparency Register:
15340821653-49

www.aggregates-europe.eu

Aggregates Europe - UEPG

UEPG_Aggregates

uepg_agg

Aggregates Europe - UEPG

Eesti Teadusagentuur

TAL TECH

Permanent Representation of Estonia to the EU

Arnout Lugtmeijer

Trisector OÜ

Funded by the European Union

Investing in your future

eit RawMaterials
Connecting matters

EIT RawMaterials is supported by the EIT, a body of the European Union

Resource Efficiency Put in Practice

Arnout Lugtmeijer
Trisector CEO

Trisector
RETHINKING RESOURCES

Sustainable Economic Development is the New Norm

- Sustainable Economic Development
- Technology Reconsidered
- Rethinking Resources

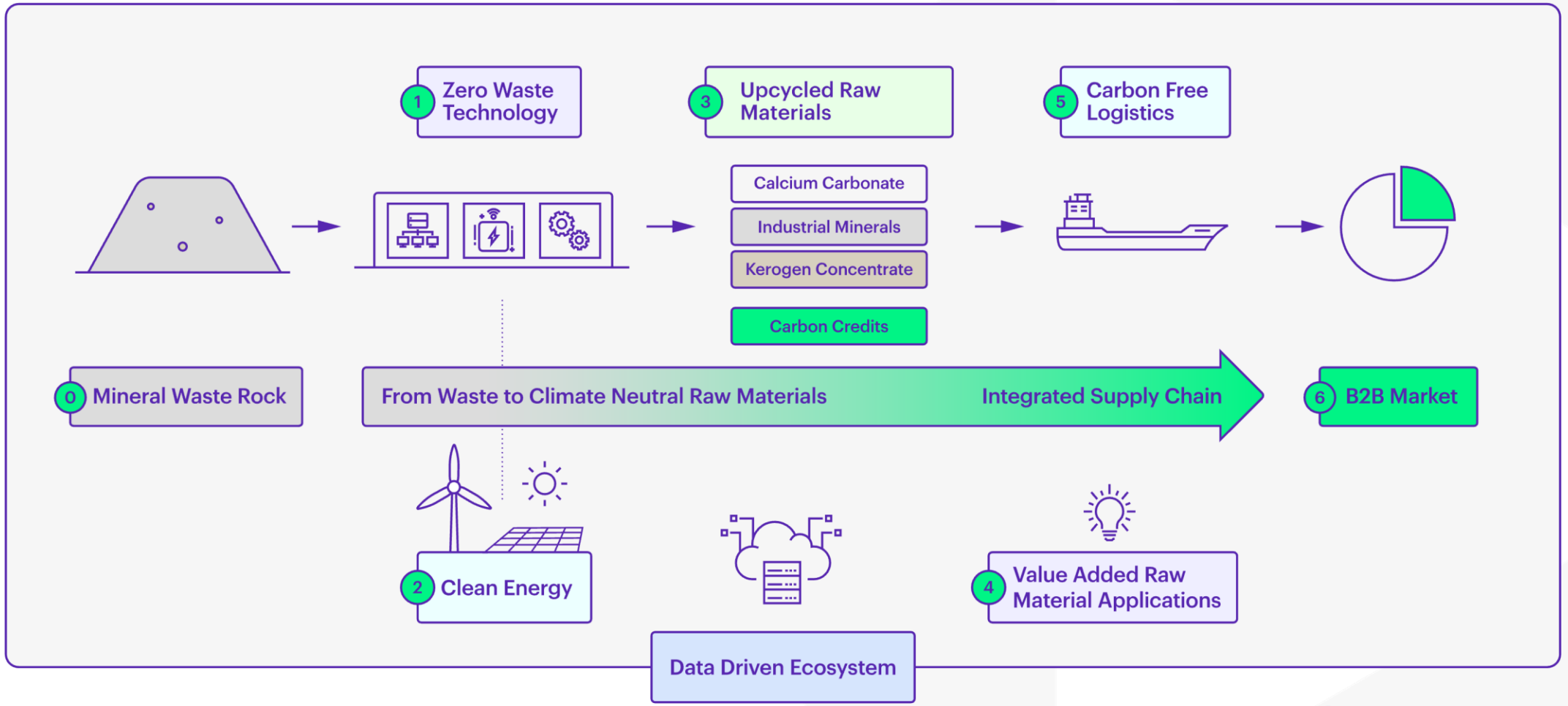
Trisector
RETHINKING RESOURCES

Insight

- Mine Tailings
- Turning Mining Left-Overs to Sustainable Products
- Innovation Leadership

Trisector
RETHINKING RESOURCES

The Big Picture



Trisector
RETHINKING RESOURCES

Applications for Upcycled Raw Materials

Paper

Geopolymer & Construction Material

Plastics

Paint & Coatings

Adhesive & sealant

New Composites

Rubber, environmental, etc.

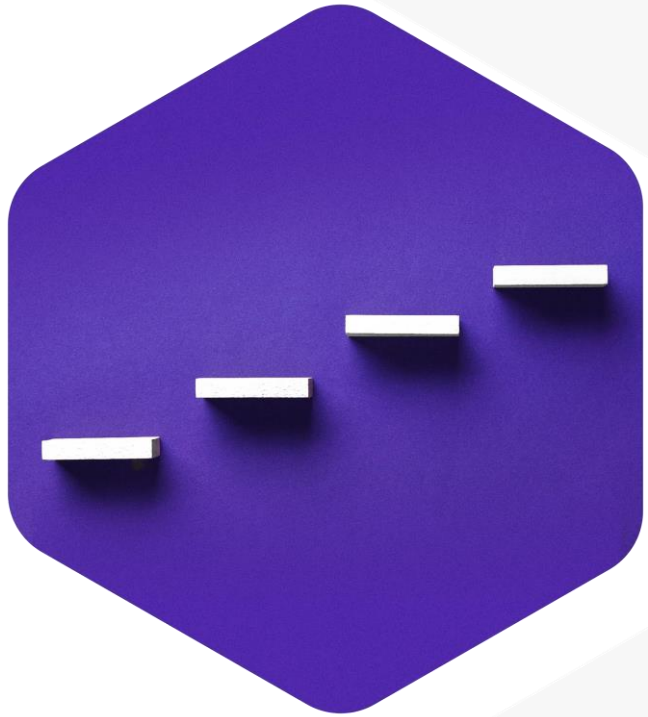
Resources for Driving Innovation

- Human
- Facilities
- Technology
- Financial
- Legislators

Trisector
RETHINKING RESOURCES

Legislators Play a Crucial Role

- Policy Framework
- Funding and Incentives
- Regulatory Compliance
- Stakeholder Management
- Promotion of Innovation Ecosystem



Trisector
RETHINKING RESOURCES

Thank you!

Trisector
RETHINKING RESOURCES