European Commission

EU Raw Materials Week

An insight into successful raw materials projects

EU Horizon Technology
Success Stories

Foreword

Raw materials are crucial for achieving the Green Deal objectives and making the green and digital transitions a reality. They are at the base of all industrial value chains and are fundamental for many green and digital technologies. By 2030, our demand for rare earth elements will be multiplied by five. Consequently, the EU Green Deal recognises access to resources as a strategic question for Europe.

President von der Leyen announced on 14 September 2022 during the State of the Union speech a European Critical Raw Materials Act: “we will identify strategic projects all along the supply chain, from extraction to refining, from processing to recycling. And we will build up strategic reserves where supply is at risk”.

Research and innovation is a key element of the EU policy on raw materials. Over the previous programming period (2014-2020), the European Commission has invested over €500 million in 80 raw materials projects. Looking forward, over €260 million are being committed for the period 2021-2022 under the new framework programme, Horizon Europe. In the next months, more funding opportunities for projects will be published.

These projects address a number of significant challenges along the raw materials value chain: developing advanced solutions for substitution and greater resource- and energy-efficiency, ensuring effective reuse and recycling, as well as clean primary production of raw materials, including critical raw materials.

The EU Horizon Technology Success Stories event offers a selection of projects under Horizon 2020 that are bringing tangible advancement in the area of raw materials.

This document portrays these projects, and will hopefully inspire researchers, companies, academia and public bodies to submit excellent applications for the upcoming calls for proposals. We count on you to continue tackling together the technological challenges along the raw materials value chain.

Marina Zanchi
Director of the Health and Digital Executive Agency (HaDEA)

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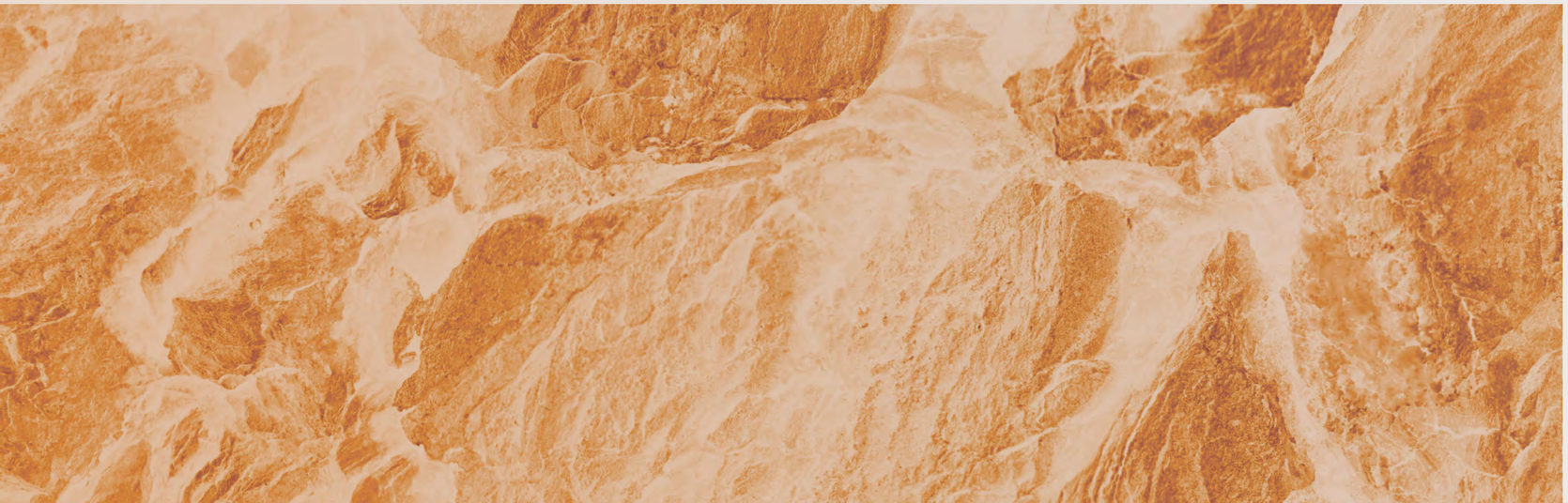
1. Raw materials in Horizon programmes

Access to raw materials attracts increasing attention. Building on the work of the stakeholder community through the European Innovation Partnership (EIP) on raw materials, Horizon 2020 was recognised in 2014 as an important instrument to achieve the necessary developments for a sustainable raw materials supply. For the first time a specific chapter dedicated to raw materials was introduced in the work programme.

Now, Research & Innovation for raw materials continues to be addressed under Horizon Europe Cluster 4 - Industry. A number of calls have already been launched under the new programme in 2021-2022, covering the green & digital transition, resource efficiency and resilience. 30 projects are being funded for over €260 million, covering primary and secondary raw materials, the raw materials supply chain and policy support.

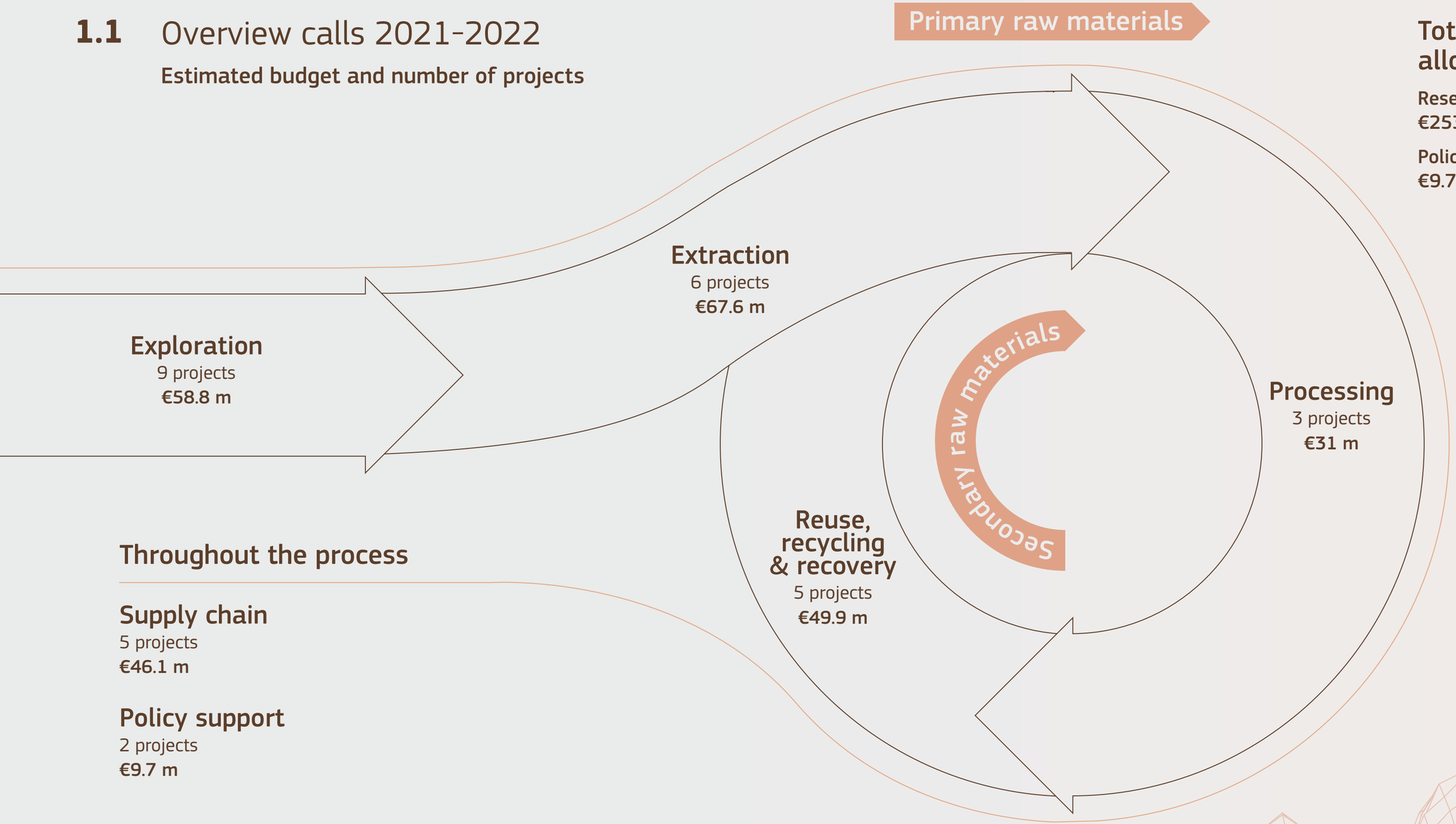
Research organisations, industry, SMEs, academia and other stakeholders addressing raw materials will continue to benefit from funding in the upcoming calls under Horizon Europe Cluster 4. We must however note that the real peak of valuable outcomes from H2020 projects comes now.

In this respect, the EU Raw Materials Week and the EU Horizon Technology Success Stories event are the opportunity to discover some of the most successful ongoing or recently finished H2020 raw materials projects.



1.1 Overview calls 2021-2022

Estimated budget and number of projects



Total budget allocation

Research & innovation
€253.4 m

Policy support
€9.7 m

Throughout the process

Supply chain
5 projects
€46.1 m

Policy support
2 projects
€9.7 m

2. Raw Materials Week and EU Horizon Technology Success Stories

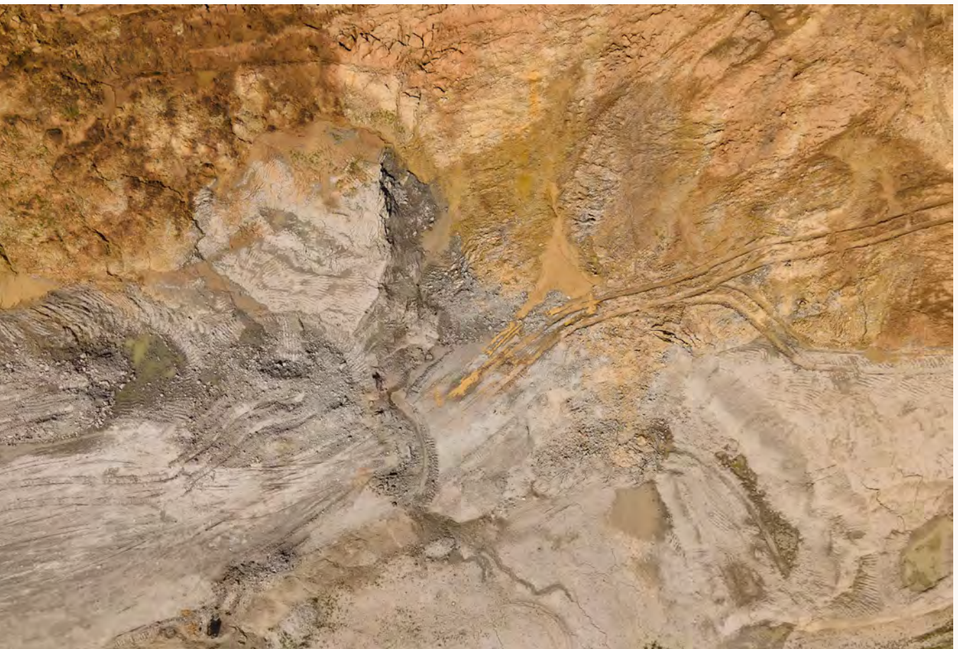
The EU Raw Materials Week gathers on a yearly basis, since 2016, a wide range of stakeholders to discuss policies and initiatives in the field of raw materials.

The Raw Materials Week consists of a series of events centered around the annual High-Level Conference of the European Innovation Partnership (EIP) on Raw Materials addressing the latest news regarding raw materials in the EU.

As part of this series of events, HaDEA organises the EU Horizon Technology Success Stories event, showcasing projects that are achieving, or have achieved, remarkable success in the relevant fields. The aim of this event goes beyond informing about the progress of the selected projects. The objective is to highlight how activities in the area of raw materials will benefit from project developments, or in broader terms how industry and society benefit from EU research funding.

2.1 EU Horizon Technology Success Stories event during the 7th Raw Materials Week

In the framework of the 7th Raw Materials Week (14-18 November 2022), HaDEA organises, in collaboration with DG GROW, the third edition of the EU Horizon Technology Success Stories event. This year's edition takes place on 14 November 2022 and will be the opportunity to present 9 projects, clustered in two different thematic areas.



Critical raw materials for ICT and robotics

- **FineFuture** seeks to enhance the competitiveness of the European industrial minerals industry by developing new technologies to valorise fine particles from mining waste into valuable materials, among others magnesite.
- **ROBOMINERS** proposes an innovative approach to use a robot miner for mineral deposits (containing critical raw materials such as, among others, vanadium) that are small or difficult to access. This covers both abandoned, nowadays flooded mines, or places that have formerly been explored but whose exploitation was considered as non-viable.
- **Sea4Value** designs and implements technologies for recovering minerals and metals from seawater desalination brines. The aim is to make desalination plants the third source for raw materials in the European Union, such as magnesium and scandium.
- **SisAlPilot** demonstrates an innovative silicon production process with low environmental impact using secondary aluminium and silicon raw materials.

Critical raw materials for batteries and permanent magnets

- **SUSMAGPRO** demonstrates a recycling supply chain for permanent magnets in Europe, demonstrating their effective reuse within several industries.
- **SecREEts** seeks to establish a stable and secure supply of rare earth elements based on a sustainable extraction from European apatite sources used in fertiliser production.
- **GoldeyEye** implements a unique combination of remote sensing and positioning technologies, exploiting Earth observation and Earth GNSS data. The platform allows satellites, drones and in-situ sensors to collect high-resolution data of the entire mine, which can be processed and converted into actionable intelligence for safety, environmental monitoring and overall productivity.
- **SEArcularMine** develops innovative, sustainable and cost-effective technologies to secure European access to magnesium (Mg), lithium (Li) and other trace elements (Rb, Sr, Cs, Ga, Ge, Co), from waste brines in Mediterranean basin saltworks. The project targets very low energy consumption, alongside using novel technology to generate electricity from salinity gradients of seawater.
- **CROCODILE** showcases innovative metallurgical systems based on advanced technologies for the recovery of cobalt and the production of cobalt metal and upstream products from a wide variety of secondary and primary European resources.

2.2 Looking back at the EU Horizon Technology Success Stories event during the 6th EU Raw Materials week

Similarly, during the 6th EU Raw Materials Week, the EU Horizon Technology Success Stories event, co-organised by DG GROW and HaDEA, gathered some of the most promising projects for the raw materials sector funded under Horizon 2020. The EU Horizon Technology Success Stories event took place online on 15 November 2021.

The event addressed primary and secondary raw materials (exploration, extraction, processing, refining, recovery, recycling) with 11 selected projects clustered in two distinct sessions.

2.2.1 Session: Securing the supply of primary raw materials in a sustainable and responsible way

The high costs of exploration activities, the location of new deposits (small, complex, very deep, or in extreme environments) and the geological uncertainty are currently major challenges in raw materials extraction. Some of these challenges can be tackled with highly efficient and cost-effective, sustainable exploration technologies that can lower the cost and expand the reach of exploration activities. Integrating and interpreting all the information available into new geomodels can also lead to a decrease in exploration costs.

At the extraction step, the techno-economic feasibility of a mine deployment and operation can be jeopardised if the new deposits are small, complex, and located at deeper locations, or in more extreme environments. Access to these unexploited deposits requires novel, sustainable and environmentally sound mining solutions. These need to be to be integrated already in the processing step to create an overall economically viable process. Find five examples of Horizon 2020 projects below.

The **PACIFIC** project, for example, has developed low-cost and environmentally friendly tools for exploring mineral deposits beneath the surface. The **Smart Exploration** project has addressed the need for subsurface imaging of high resolution in the mineral exploration industry, while **INFACT** has developed innovative geophysical and remote sensing technologies.

At the same time, mining must comply with the highest environmental and health standards. Modern extraction strategies must envisage also measures that minimise or eliminate negative impact on the environment and the population. In this regard, the project **IMPACT** has developed a mobile modular containerised plant for selective, low impact mining of small high-grade deposits that make viable the exploitation of small complex deposits. **X-Mine** has piloted an intelligent mining system with integrated sensing technologies, based on X-ray analysis.

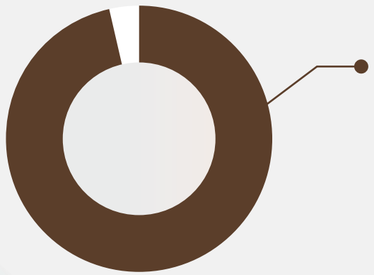
Discover how these H2020-funded projects address these challenges:

PACIFIC

Passive seismic techniques for environmentally friendly and cost efficient mineral exploration

Research and Innovation Action (RIA)

1 June 2018 - 30 November 2021



EU contribution
€ 3 200 066

Total budget
€ 3 320 691

CORDIS

Keywords

Exploration
New passive developments seismic technologies provided a low-cost, environmentally friendly means to discover deeply buried ore deposits.

Opportunistic seismic noise sources
Exploitation of non-traditional seismic noise sources, such as freight trains or compactors, improved the quality and resolution of passive seismic models.

Public perception of the minerals industry
Surveys of public opinion and understanding of mining and mineral exploration provided insights on how to communicate better on these issues.

Uptake and follow-up

Four commercial partners of PACIFIC – Generation PGM, Sisprobe, IMS and Beowulf – have used the technologies developed in the project in their mineral exploration, and many other European and non-European companies have expressed interest. Five of the involved companies have commissioned surveys of public opinion.

To commercialise the results, PACIFIC partners have developed a business plan that includes active promotion and advertising such as participation in trade shows and the demonstration of the technologies at new test sites.

Results

The improved passive seismic technologies developed in this project have already been adopted in ongoing exploration projects in one European and several non-European countries. Regarding public opinion, the surveys have helped to define new targets that will be tested in the near future.

Benefit for EU

The new passive seismic technologies will help exploration companies to find new ore deposits in Europe, improving Europe's mineral resilience.

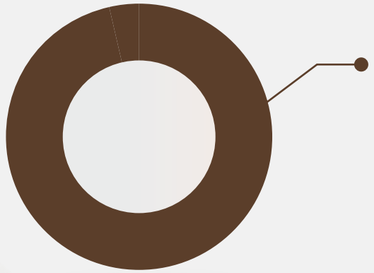
The project approach on how to communicate with decision-makers, the media and the general public will help to improve the overall perception of the minerals industry and facilitate the development of new exploration and mining operations in Europe and elsewhere.

Smart Exploration

Sustainable mineral resources by utilizing new Exploration technologies

Research and Innovation Action (RIA)

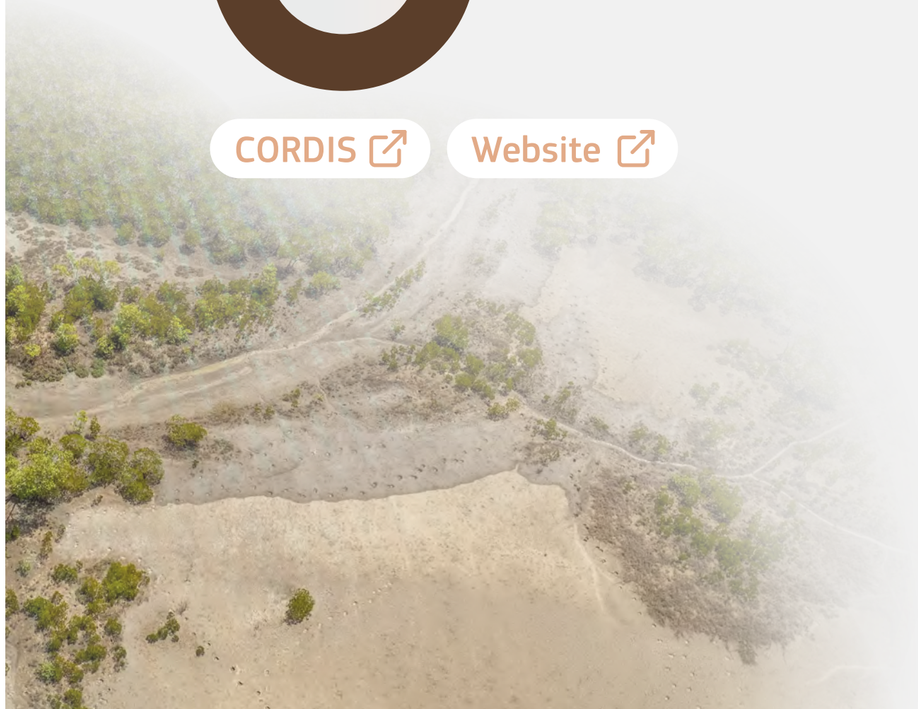
1 December 2017 - 30 November 2020



Total budget,
all funded by the EU
€ 5 217 843

CORDIS

Website



Keywords

Exploration
The development of innovative tools and methodologies improved the effectiveness and sustainability of geophysical exploration.

Prototypes
Innovative equipment was designed, engineered and validated to expand the potential of geophysical mineral exploration.

Legacy data
New methods applied to legacy data provided further information and added new value to them, contributing to generate new exploration targets or improve knowledge about known targets.

Uptake and follow-up

Mining companies improved their knowledge of the ore bodies and several companies continue to cooperate by using the projects results. In several cases, the ore deposit size was extended, while in others the clearer geological model allowed a more effective planning of the mining activities.

Some SMEs have developed new products that are now on the market (two have been patented), while other SMEs entered a new market sector.

Results

The developed tools allowed exploring and improving targets in several pilots:

- GPS time enabled surface-tunnel synchronised seismic acquisition was possible in deep mine tunnels.
- New airborne TEM (transmission electronic microscopy) acquisition system increased the in-depth investigation of classical electronic monitoring data.
- Seismic e-vib provided exceptional quality data.

Also, the project produced new methods for seismic and electronic monitoring processing tools that resulted in better delineation and reliable location of mineralised bodies and cheap and environmentally friendly subsurface models.

Five pilots were explored in the project, with a significant improvement of the knowledge of potential targets. Many new datasets (some of them with novel and unique approaches) provide material for testing new methods since the end of the project.

Benefit for EU

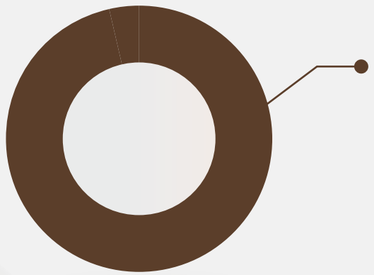
Smart Exploration demonstrated novel and sustainable exploration methods and tools to facilitate exploration of new ventures in environmentally sensitive areas and with greater social awareness. More than 100 papers were published, disseminating knowledge on scientific and technical developments. The project also contributed to the professional development of young professionals in the mining sector.

INFACT

Innovative, Non-Invasive and Fully Acceptable Exploration Technologies

Research and Innovation Action (RIA)

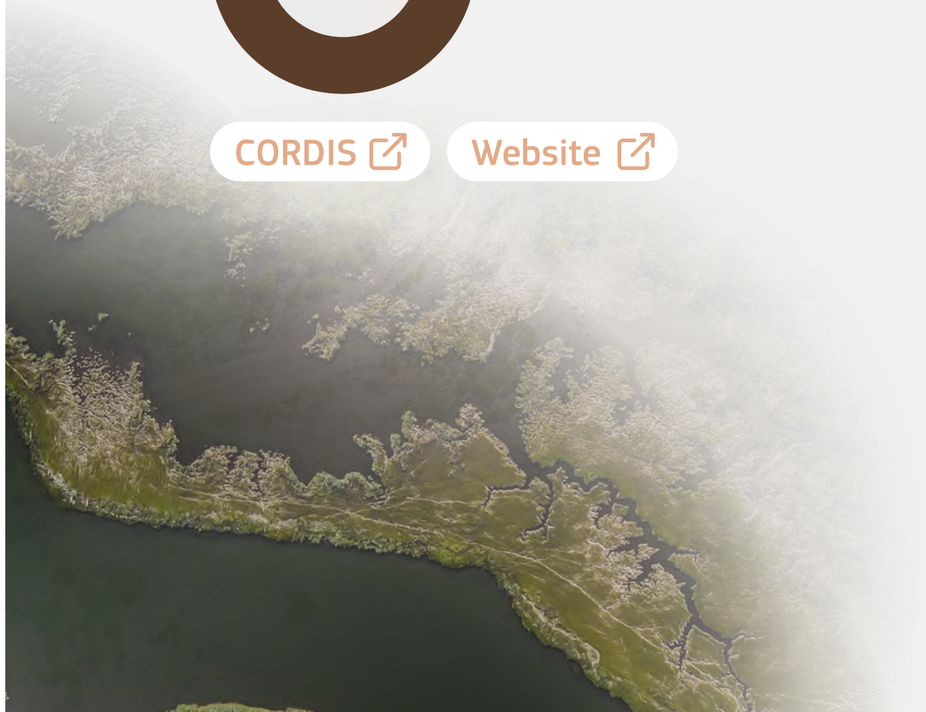
1 November 2017 – 31 January 2021



Total budget,
all funded by the EU
€ 5 624 029

CORDIS

Website



Keywords

Technical development and exploration
INFACT supported the development of non-invasive exploration technologies.

Benchmarking & Certification
The project allowed the assessment of technical, social, and environmental performance of exploration technologies on well-constrained geology and mineralisation.

Social dialogue and environment
The project created a certification scheme for best-practice mineral exploration to increase trust of decision makers, investors and civil society.

Uptake and follow-up

Technology developers, academia and mineral industry will continue to have access to the Reference Sites for testing. These sites allow an assessment of exploration techniques, for identifying mineral deposits, also taking into account the environmental impact and perception of local stakeholders in the diverse contexts of exploration.

Results

The INFACT project established four European reference sites, with a rich and diverse exploration portfolio (including extensive drill holes and geophysical databases), covering a broad range of geological, social and climatic conditions. Over the course of the project, the sites were used to test and develop innovative and non-invasive exploration technologies, such as:

- full-tensor magnetic gradiometry;
- airborne low-frequency electromagnetics;
- drone-borne magnetics.

Other tools developed by the project are the INFACT discovery roadmap, INFACT portal and INFACT exploration decision tree. They are available to governments, NGOs and civil society.

Benefit for EU

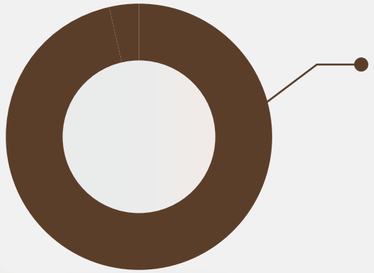
INFACT has identified three key enablers to more socially acceptable mineral exploration: 1) policy and governance, 2) finance and economy, 3) and public opinion. The INFACT Discovery Roadmap charts pathways for establishing a responsible minerals industry in Europe, meeting the needs of the EU Green Deal and contributing to the UN SDGs.

IMP@CT

Integrated Mobile modularised Plant and Containerised Tools for selective, low-impact mining of small high-grade deposits

Research and Innovation Action (RIA)

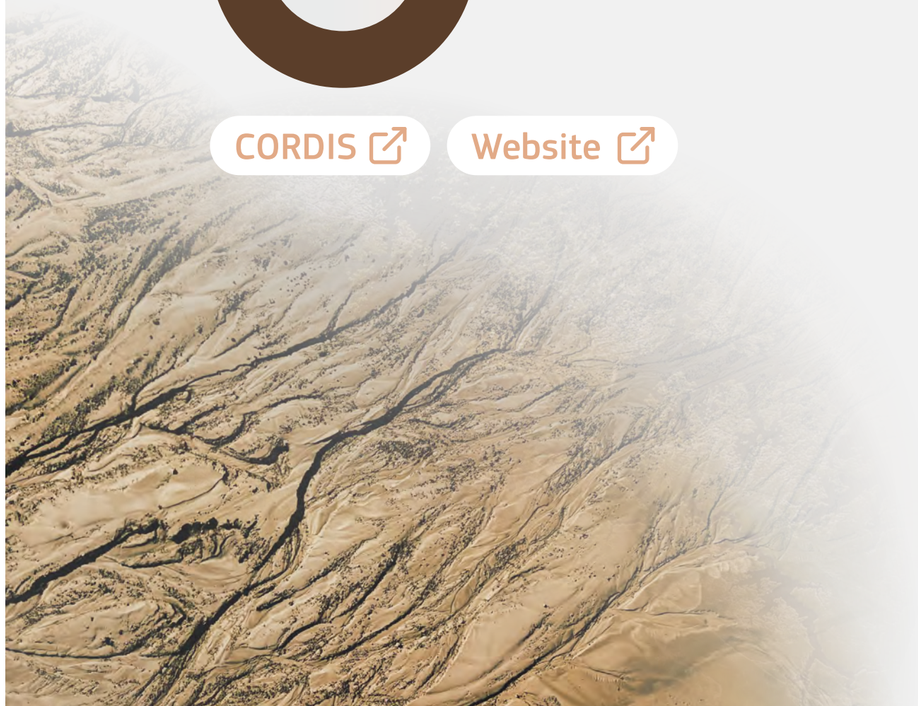
1 November 2017 – 31 January 2021



Total budget,
all funded by the EU
€6 991 820

CORDIS

Website



Keywords

Mining

The project demonstrated that small-scale mining operations are suited for geographically dispersed critical (and other) metal production. Mobile and modular technological solutions (from mine face to production of concentrate) were tested in two mines.

Geometallurgy

Geological uncertainty and metallurgical variability strongly influence the efficiency of extraction and processing of ore from small complex deposits. IMP@CT developed frameworks to respond to variability, and to increase early knowledge acquisition, to predict impacts on the processing activities and to handle materials.

Sustainability

The project created a tool to predict the impacts of processing on water quality, with environmental and social life cycle analysis, when reducing the volumes of material transported, sorted and managed.

Uptake and follow-up

- CM 4500 MIDI cutting tool was commercialised for tunnel construction.
- Already-patented ore-sorting technologies are on the market.
- New water-treatment plant based on the specifications of the project has been designed.
- Mining companies have stated interest in the mobile and modular gravity-separation equipment, should market conditions become favourable.
- Alternative applications of the equipment in a circular economy are envisaged.

Results

A small underground mining tool was developed, which works with surgical-like precision and can extract the desired rock causing less damage.

This tool facilitates the mining process and decreases the associated environmental impacts. With its cutting head it controls particle size at the rock face, reducing the subsequent crushing required; the sorting technology separates the ore from the waste prior to crushing; and the transport impact is reduced, since it can be mobilised in standard 20-foot containers.

Also, energy modelling demonstrated that modular and mobile renewable energy solutions are sometimes more cost-efficient than diesel-based off-grid solutions (depending on the duration of deployment of equipment).

Benefit for EU

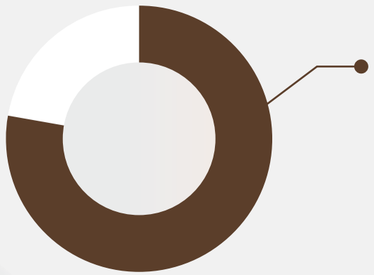
A small-deposit query tool is now available in the Minerals4EU database, to determine what potential exists for small-deposit mining across Europe as well as information on small-scale mining in Europe.

X-MINE

Project: X-MINE - Real-Time Mineral X-Ray Analysis for Efficient and Sustainable Mining

Innovation Action (RIA)

1 June 2017 – 31 August 2021



EU contribution
€ 9 318 197

Total budget
€ 12 064 712

CORDIS

Website

Keywords

Sustainable mining
The project developed solutions for sustainable mining including efficient exploration, modelling and sensor based pre-concentration.

X-ray analysis
The project developed advanced methods for efficient ore and mineral analysis

X-ray sorting
The project developed efficient sorting methods for mineral preconcentration before further processing.

Uptake and follow-up

1 Sensor producers developed X-ray imaging systems for on-line high-resolution XRT/XRF imaging.
2 During the project, different prototypes optimised analysis and mineral sorting applications were developed. These can be used in various applications outside the mining sector.
3 A sensor-based sorting provider integrated the developed technologies into their sorting systems, allowing wider range of application possibilities and providing a more competitive equipment in the mining sector. Some integrated sorting solutions were tested in one of the mines participating in the project, and provided significant improvements. Other mines are also planning similar applications based on technologies developed during the project.

Results

The project developed a real-time sensing platform comprising a set of high performance sensors based on X-ray Fluorescence (XRF), X-ray Transmission (XRT) and 3D shape measurement technologies.
The sensing platform and the data produced were combined with mineral sorting equipment, mine planning software systems, exploration software and enhanced work procedures.

The project demonstrated these benefits:
- 20% reduction in transportation costs through more efficient ore and waste separation;
- 7% reduction in waste rock;
- 10-30% reduction in energy consumption and CO_2 emissions.

Furthermore, the project successfully demonstrated the prototypes in four different metallogenic belts, in simple cases (lead-zinc ore) and in more complex cases (critical raw material detection in a complex matrix).

Benefit for EU

The project results provided advanced mineral exploration, better resource characterisation and estimation. The technologies developed allowed a better and more efficient ore extraction in existing mine operations, requiring less blasting for mining, and made complex deposits economically feasible, with minimal environmental and health impact.

2.2.2 Session: Secondary raw materials – improving resource efficiency and circularity

Raw materials are essential inputs for the competiveness of industry and for the development of many environmentally-friendly clean-technology applications. Innovation is key to the EU's potential in this area along the entire value chain, and especially in processing and refining technologies for better recovery of minerals and metals from side streams or industrial waste.

Four excellent projects have developed material- and cost-efficient processing technologies. **SecREEts** develops processes to extract, separate and transform rare earth elements for their application in electric vehicles, industrial motors and wind turbines. **RemovAL** strives to remove waste streams from the primary aluminium production and other metal sectors in Europe. **NEMO** focuses on near zero-waste recycling of low-grade sulphidic mining waste for producing critical metal, mineral and construction raw material. **PLATIRUS** has demonstrated platinum group metals can be recovered from spent autocatalysts.

In addition, as worldwide demand for raw materials increases, greater efforts have to be made on recycling. Higher recycling rates will reduce the pressure on demand for primary raw materials, help to reuse valuable materials which would otherwise be wasted, and reduce energy consumption and greenhouse gas emissions from extraction and processing.

In that perspective, **COLLECTORS** project focuses on local good practices for municipal waste collection that would lead to high quality recycling. Another example is the **CEWASTE** project that focuses on waste from electrical and electronic equipment (WEEE) and batteries that contain significant amounts of valuable and critical raw materials. CEWASTE has developed a voluntary certification scheme for their collection, transport and treatment at waste facilities.

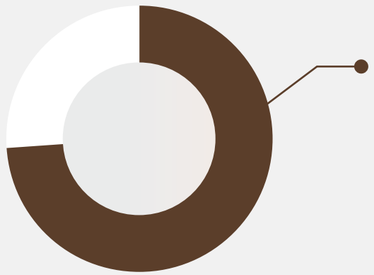
Find out how these H2020 projects tackle these challenges:

SecREEts

Project: SecREEts - Secure European Critical Rare Earth Elements

Innovation Action (IA)

1 June 2018 - 30 November 2022



EU contribution
€ 12 880 031

Total budget
€ 17 224 132

Website

Keywords

Critical rare earth elements (REEs)
SecREEts aimed at establishing a stable and secure supply of critical REEs based on innovative extraction, separation, and transformation of REEs.

Sustainability
The piloted processes focused on the sustainability aspects of its operations for a sustainable raw materials production in the EU.

Life Cycle Assessment (LCA)
LCA analysis and results are used to measure the environmental impact of the project and to compare it to current standard procedures.

Uptake and follow-up

The project value chain will serve several European industrial companies dependent on rare earth elements, on permanent magnets and its downstream products, to secure supplies. The produced magnets will be supplied to application areas such as automotive (electric vehicles), industrial motors (advanced manufacturing), and potentially, clean energies (wind turbines).

Results

The project has been working on extracting a concentrate of rare earths from fertiliser production (phosphate rocks), which are not currently being extracted. The preliminary results calculated so far reveal that the production of permanent magnets through the innovative SecREEts technologies are showing lower environmental impact than conventional production known today. This is because new mining waste is not being created. A successful industrial implementation of the pilots could lead to a supply of at least 600 tonnes annually of neodymium-praseodymium (NdPr).

Benefit for EU

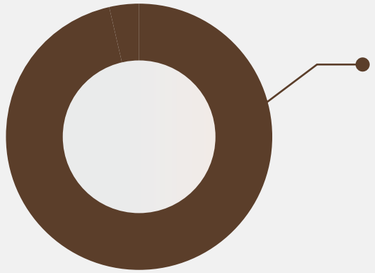
The project targets the European value chain for the production of rare earth elements from available mineral resources, securing critical raw needed for magnet production in Europe, crucial for the green transition.

PLATIRUS

PLATInum group metals Recovery Using Secondary raw materials

Research and Innovation Action (RIA)

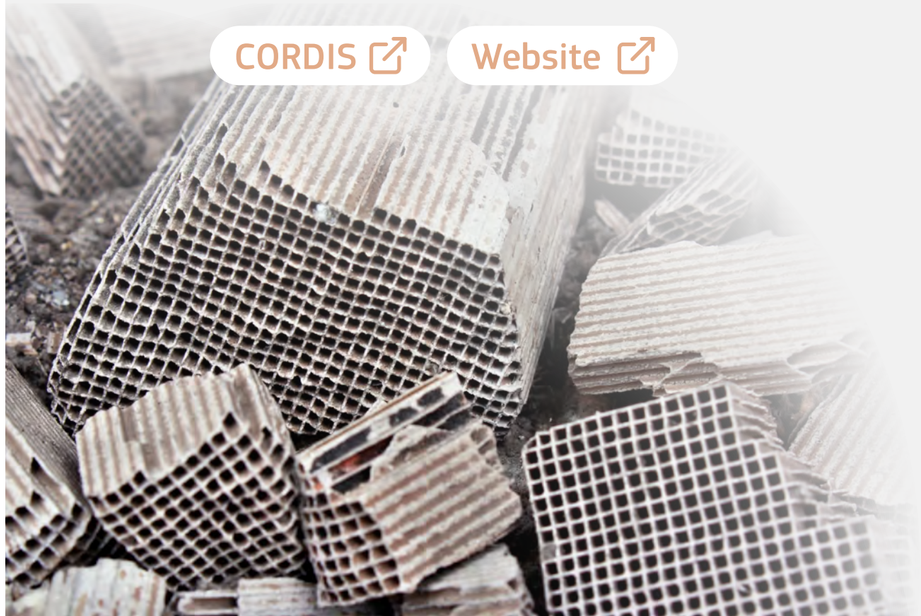
1 November 2016 - 30 April 2021



Total budget,
all funded by the EU
€ 6 994 210

CORDIS

Website



Keywords

Critical raw materials
New process to reduce the gap between the demand and the supply of Platinum Group Metals (PGM), a group of 6 precious metallic elements widely used in the automotive sector, industry and healthcare.

Waste management
Recovery of PGMs from used auto-catalysts, anode slime, tailings and waste electrical and electronic equipment (WEEE).

Advanced hydrometallurgy, ionometallurgy, solvometallurgy and electrometallurgy
New PGM recycling process is based on advanced recovery technologies.

Uptake and follow-up

The project's development will continue within the new EU-funded project PEACOC (Pre-commercial pilot for the efficient recovery of Precious Metals from European end-of-life resources with novel low-cost technologies).

PEACOC is the direct upscale to TRL7 of two selected technologies in the PLATIRUS flowsheet (microwave leaching and gas diffusion electrocrystallisation). Several PLATIRUS industrial partners will contribute to the process development, scale-up and commercialisation, by validating these technologies directly on their waste streams or hosting pilots in their facilities.

Results

PLATIRUS has demonstrated successfully that PGMs recovered from waste using their flowsheet can be used to manufacture new auto-catalysts with similar or better performance than commercial ones. Auto-catalysts are one of the largest PGMs market in the world.
The PLATIRUS flowsheet comprises a combination of advanced PGM recovery technologies: microwave leaching, ionic liquid based liquid-liquid extraction and gas diffusion electrocrystallisation.

The advantages of this novel recycling process include: simplification of the process (less steps) and reduction of capital requirement, reduced CO2 emissions (previous thermal treatment to concentrate the PGMs is not required), and a reduced amount of chemicals used.

Benefit for EU

The PLATIRUS technologies will be beneficial to other sectors and applications using PGMs such as:

- electrolysers for green hydrogen production (fuel cells are used to produce electricity by combining hydrogen and oxygen);
- catalysts for manufacturing key chemicals such as nitric acid (used to produce for fertilizers, polymers, etc).

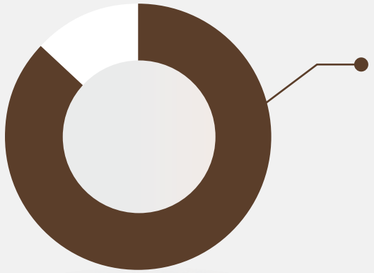
The consortium has established a new European secondary PGM production chain that could create new jobs, increase the EU's independence from imports and provide valuable raw materials for the local industries - e.g. automotive, chemical, jewellery.

NEMO

Near-zero-waste recycling of low-grade sulphidic mining waste for critical-metal, mineral and construction raw-material production in a circular economy

Innovation Action (IA)

1 May 2018 - 31 October 2022

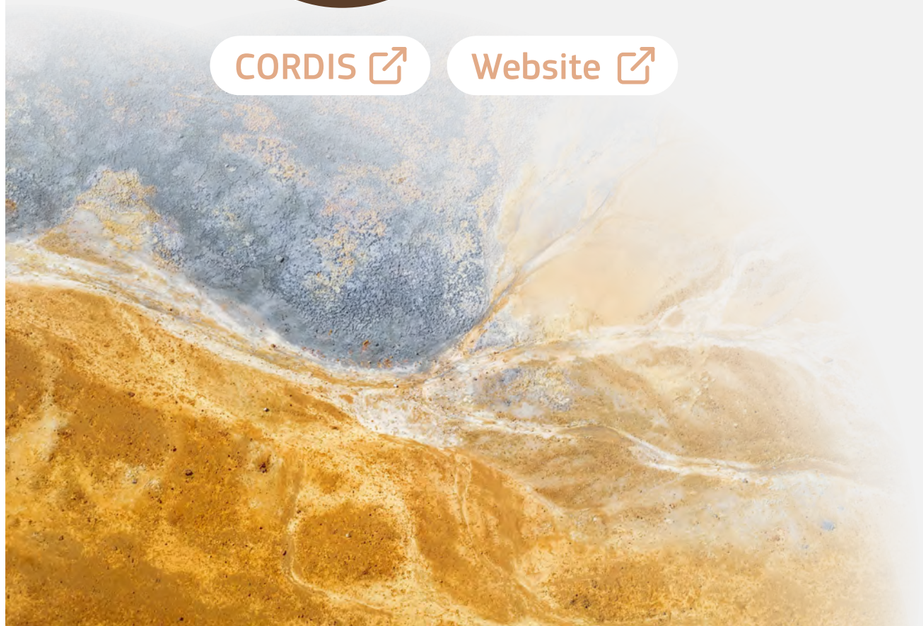


EU contribution
€ 12 407 294

Total budget
€ 14 189 079

CORDIS

Website



Keywords

Waste valorisation
Mining Industry's waste is used for added-value applications.

Mine tailings
The project focuses on sulphidic extractive waste, also known as tailings.

Cement and concrete
The project targets to valorise the tailings for cement and concrete applications.

Uptake and follow-up

The project focused on high substitution rates in cement or concrete for industrially common product qualities. At current stage, the substitution rate achieved for the same product quality is 30%. These values are covered by the European standards and allow industrial application.

The project will continue monitoring the delivery of samples and the performance of the different pilots. These updates were collected for engineering activities and supported the final validation of the models used as a base for NEMO's 'virtual plant', designed to simulate a whole zero-waste plant. NEMO will studied additional mining sites to develop feasibility studies for implementing NEMO technologies.

Results

Sulfidic mining waste residues generated from mining and processing sulfidic ores (necessary to produce copper, zinc, lead, nickel and other critical metals) represent the largest extractive waste in Europe. NEMO has developed processes and mixtures that can incorporate a high percentage of mine tailings and has demonstrated the potential use of mine tailings in concrete products at TRL7-8. Results include the development and evaluation of novel unit processes and flowsheets for the hydrometallurgical valorisation of low-grade base metals from processing residues.

Benefit for EU

When poorly managed, copper, lead, zinc and nickel tailings may cause major environmental problems such as acid mine drainage. These tailings still contain valuable and critical metals; NEMO develops, demonstrates and exploits, new ways to valorise sulphidic mining waste.

The pilots are located at key points in the near-zero-waste flowsheet:

1. the recovery of valuable & critical metals;
2. the safe concentration of hazardous elements;
3. the removal of sulphur as sulphate salts while using the residual mineral fraction in cement, concrete and construction products.

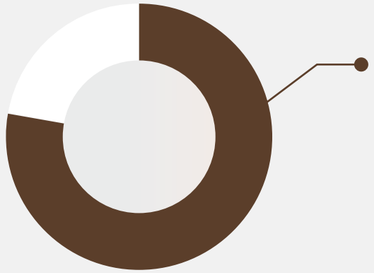
The technical and economic feasibility of the pilots was demonstrated in mines in Finland and Ireland, as well as in a processing facility in Finland.

RemovAL

Removing the waste streams from the primary Aluminium production and other metal sectors in Europe

Innovation Action (IA)

1 May 2018 - 31 October 2022



EU contribution
€ 11 481 599

Total budget
€ 14 658 966

CORDIS

Website

Keywords

Waste valorisation
The project looked into new technologies to valorise the bauxite residue produced in the alumina sector.

Pilot demonstrations
The project demonstrated the new technologies in several pilot plants across the EU.

Integrated evaluation
The project assessed techno-economically and environmentally integrated flowsheets combining the developed technologies.

Uptake and follow-up

Results are expected to benefit the alumina industry in the EU and beyond. Joint ventures for industrial plants are being discussed with SME technology developers. The plants will be expansions to existing alumina plants or as stand-alone bauxite residue (BR), or in some cases other industrial by-products, treatment centres.
The next step will be to combine the results in sustainable flowsheets that can achieve complete BR valorisation in specific alumina plants with waste generation close to zero.

Results

RemovAL provided a sustainable pathway to valorise bauxite residue (BR) along with other industrial by-products, taking into consideration waste characteristics, logistics and the potential for symbiosis with other nearby plants. The project improved several treatment options for BR re-use, validating the results with four different BR streams. BR and other industrial by-products were used to produce a stable and safe substrate for road construction, as demonstrated in a pilot application in Ireland.

Benefit for EU

The valorisation of BR across the EU will provide significant access to raw materials in Europe such as:

- the equivalent of 3.4 million tonnes of iron ore, with a 4% decrease in iron-ore imports and an 18% increase in European iron-ore production;
- extracting rare earth elements (REE) like scandium and gallium from the BR in aluminium production.

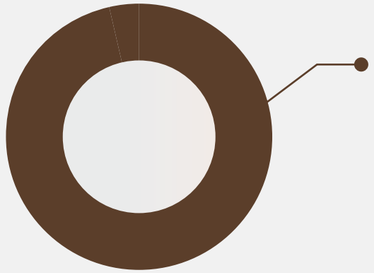
Achieving a 100% reuse of BR, will provide significant gains in environmental and resource preservation, in addition to having a EU-based production of critical raw materials.

COLLECTORS

Waste collection systems assessed and good practices identified

Coordination and Support Action (CSA)

1 December 2017 - 31 December 2020



Total budget,
all funded by the EU
€ 1 498 400

CORDIS

Website

Keywords

Waste management
The project collected, analysed and disseminated local good practices on municipal waste collection that lead to higher quality recycling.

Multi-criteria assessment
The project assessed the overall performance of collection systems using socio-technological perspectives, life cycle assessments and cost-benefit analyses.

Knowledge-sharing
Stimulating sharing of knowledge and best-practices among adopters enabled a shift towards better performing systems.

Uptake and follow-up

The project was carried out in close collaboration with key end users: local and regional decision-makers on waste management, including public research organisations, making sure that project results were aligned with stakeholders needs. The project's recommendations already appear to have an impact, as several consortium partners are working with local and regional waste collection authorities to implement them.

Results

The project collected information on 242 waste collection systems from across Europe. This data was harmonised, analysed and compiled into an online database that can be searched either by a particular waste flow characteristic or by local/regional characteristics. The database is publicly available and provides local and regional authorities with detailed information on the organisation and performance of systems of similar cities or regions.

The project produced practical guidelines for local and regional authorities that highlight:
- effective practices and instruments;
- how to overcome local specific challenges;
- and what environmental and economic benefits can be obtained by improving the waste collection systems.

At the European and national level, they provided policy recommendations to improve the EU and national frameworks that promote ambitious local waste strategies.

Benefit for EU

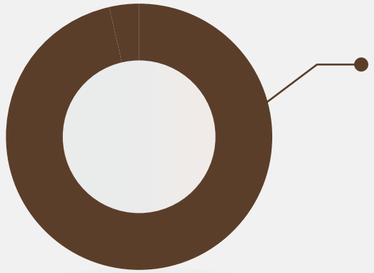
The project filled a knowledge gap by providing the information needed to shift towards better performing waste collection systems. Waste collection is an increasingly important topic, not only for decision makers, but also for European citizens as well.

CEWASTE

Voluntary certification scheme for waste treatment

Coordination and Support Action (CSA)(CSA)

1 November 2018 - 30 April 2021



Total budget,
all funded by the EU
€ 1 924 717

CORDIS

Website

Keywords

Critical Raw Materials (CRMs)
In response to the challenges associated with the supply of CRMs for the EU economy and high-tech industries, the CEWASTE project contributed to achieving a more secure supply of these materials through improved and sustainable recycling processes

Waste recycling management
By singling out the types of equipment and components that contain high concentration of CRMs, the project has developed tools and proposed a framework to improve the recycling of the corresponding waste groups.

Standardisation
In order to enable sustainable waste recycling value chains, the project has developed a set of normative requirements and verification systems for collection, logistics and treatment facilities of key types of waste containing CRMs.

Uptake and follow-up

The CEWASTE's baseline analysis and the normative requirements are being considered by CENELEC (European Committee for Electrotechnical Standardisation) as a basis for their upcoming work on the Ancillary Action 'Material efficient recycling and preparation for re-use' mandated by the European Commission.

Additionally, the CEWATSE's normative requirements are being considered as a key reference by the Sustainable Recycling Industries programme to develop a standard on e-waste recycling in South Africa.
The key results of the project have been added to the Raw Materials Information System (RMIS) platform, as further integration opportunities are being evaluated.

Results

CEWASTE developed a baseline and gap analysis, normative requirements and related assurance and verification system for the recycling of CRMs. The project has provided:

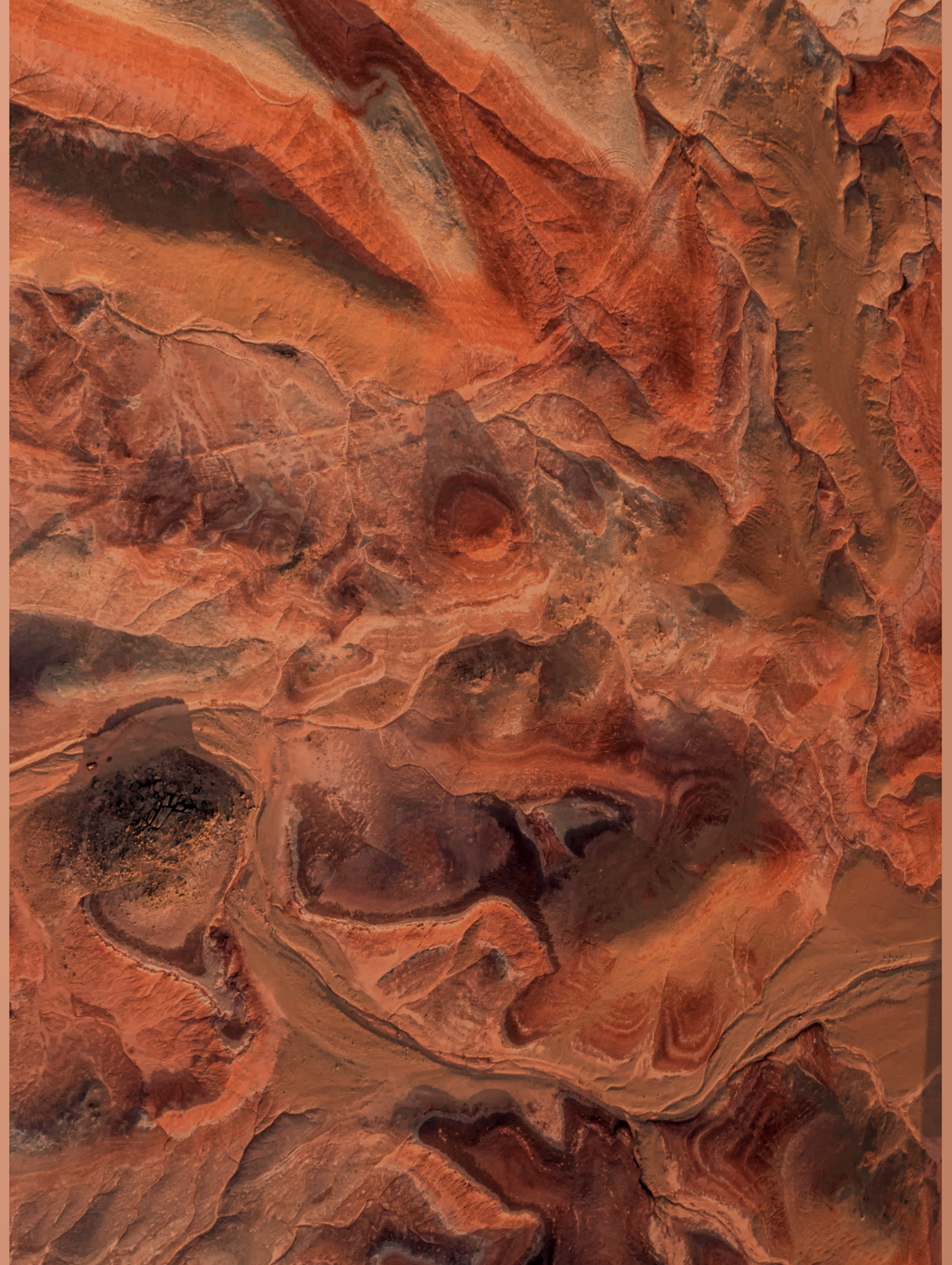
- a package of knowledge and tools applicable to the industry sector, standardisation and certification bodies;
- the project has provided a set of solutions, recommendations and a roadmap to overcome the challenges of recycling CRMs and improve its recovery.

Furthermore, the project contributed to knowledge sharing and awareness raising on the issues and needs for a secure access to critical raw materials.

Benefit for EU

Adopting the CEWASTE standard and implementing its recommendations should contribute to:

- more environmentally and socially sound recycling systems;
- increased level playing field and better framework conditions for fair, sustainable and resilient access to CRMs, which are crucial for the EU economy.



3. Conclusions

The projects presented in this document and at the EU Horizon Technology Success Stories event are only highlights from the rich landscape of Horizon projects innovating in raw materials. Under Horizon 2020 (2014-2020), the European Commission has channelled over €500 million in 80 raw materials projects, mostly for technological research and innovation.

The first calls for proposals related to raw materials under Horizon Europe are expected to add significant new results to this trove of scientific and technological developments. With this funding the R&I community should tackling together the challenges along the raw materials value chain.

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