

Our Knowledge & Innovation Themes:

1. Exploration and raw materials resource assessment

The identification and evaluation of the techno-economic value of ore bodies, residue stocks and landfills is vital for the valorisation of Europe's resource potential and for a secure RM supply. Innovation areas include:

- Transfer and adapting of value estimation methods from primary to secondary resources;
- 3D/4D modelling of ore belts and regimes based on big data interpretation;
- Deep exploration techniques.

2. Mining in challenging environments

Innovative mining solutions are required to extract materials from resources not previously exploited for economic, environmental or safety reasons. Innovation areas include:

- Mining automation, remote control and advanced maintenance systems;
- Effective integration of rock mechanics, mine planning and operations;
- Technologies and concepts to mine the sea bed in a sustainable way.

3. Increased resource efficiency in mineral and metallurgical processes

A step-change is required to enable treatment of resources of decreasing grade and increasing complexity. Innovation areas include:

- Flexible and economic treatment of complex material feed streams;
- Address the increase of impurities due to recycling;
- New products from waste and solutions for an increased reuse of process residues.

4. Recycling and material chain optimisation for End-of-Life products

Innovation to boost reuse and recycling rates of end-of-life products by optimisation of the material chain in an integrated way, from the product design phase to the end-of-life stages, is needed. Innovation areas include:

- End-of-life valorisation solutions designed with the help of product-centric modelling tools;
- Upstream recycling steps to cut recycling losses in complex material combinations;
- Business and logistics networking with industrial ecology and industrial symbiosis.

5. Substitution of critical and toxic materials in products and for optimised performance

In order to address the challenges presented by existing material combinations, a range of substitution approaches will be used to develop suitable alternatives. Innovation areas include:

- Development of alternative materials for substitution;
- Tools to model the links between materials, components and product systems;
- Virtual product design and prototyping using big data.

6. Design of products and services for the circular economy mixed performance

The circular economy calls for the reduction of material intensity, i.e. for using less RM per unit of function, thanks to smart product-service combinations and novel business models. Innovation areas include:

- Innovative techno-economic approaches for product life extension, maintenance, reuse, remanufacturing, recycling;
- Business models based on innovative concepts regarding product ownership, e.g. leasing, pay-per-use, shared use;
- Simulation tools for comparative assessment of alternative approaches. mixed performance