European Innovation Partnership on Raw Materials

Application for a Raw Materials Commitment

**Creation of a European research network on ore processing and extractive metallurgy**

Acronym:
EUROPEM

**Links to the Strategic Implementation Plan:**
- **I. Technology Pillar**
  - **I.A Priority Area: Raw materials research and innovation coordination**
    - **Action area n° I.1 Improving R&D&I coordination in the EU**
    - 4) Research and innovation platforms
  - **I.B Priority Area: Technologies for primary and secondary raw materials' production**
    - **Action area n° I.4: Processing and refining of raw materials**
      - 1) Innovative and flexible processing
    - **Action area n° I.5: Recycling of raw materials from products**
      - 1) End-of-life products recycling

**Objectives of the commitment:**

1. Develop innovative technological solutions to optimize raw materials & waste treatment:
   Accessing strategic materials is critical. So it is of paramount importance to extend the knowledge base in processing and extractive metallurgy to optimize the transformation of ore or waste stream into valuable materials
2. Enhance EU skills in mineral processing and extractive metallurgy of ores and industrial residues:
   Industrial companies cannot afford employing all the specialists required to support their activities. But they need these specialists to exist in Europe and they need to know where to find them.
   EuROPEM will provide access to these specialists.
3. In the longer term, boost the innovation capacity of the EU raw materials related sectors:
   By training a new generation of skilled engineers and metallurgists, the network will contribute to expand the future European innovation potential.

**Description of the activities:**

Since the mid-2000s, numerous European Countries, and the European Union itself, have realized how dependent they have been on foreign imports to access non energetic raw materials. This dependence has been interpreted as a threat to Europe’s industrial network and global
competitiveness. In parallel, it has also been recognized that Europe holds valuable mineral resources in both primary and secondary markets. Sources of such minerals being either underground or in our trash boxes create new market opportunities that will support much needed economic growth in Europe. However, to size this opportunity, the development of new extractive, mineral processing and metallurgical techniques are required. Before being industrially developed, these techniques need not only to be efficient but also to take into account the economics and the environmental and societal aspects in Europe and abroad. Techniques fulfilling these requirements will first generate new IP in Europe and also allow new types of natural deposits and industrial residues to be mined, creating subsequently more wealth in Europe.

Innovation bases on strong R&D knowledge and capabilities. It is essential to enable Europe to regain its former leading position in these domains by mobilizing and networking substantial part of the European raw materials community. In addition, having good ideas is not enough to generate innovation. Helping the best ideas to reach the market by enabling them to progress on the TRL scale is critical to leverage the effect of public support in R&D and create more jobs.

In this context, numerous networks have emerged in Europe, dealing, at least partly, with the issue of mineralurgy and extractive metallurgy (e.g. the Era-net on non-energetic raw materials ERAMIN or the REE focused network ERECON). Nevertheless, there is still a lack in Europe of a structure bridging closely research and innovation of the primary and secondary raw materials value chain and business models that allow cross fertilization of ideas and successful demonstration up to the pilot scale.

The EuROPEM Network fills this gap by gathering academic and industrial partners. It aims at coordinating and financially supporting R&D works on transversal issues in the fields of mineralurgy and extractive metallurgy. The annual funding of the network will originate from fees of the members and EU as well as national support (depending on the opportunities).

Activities:
- Supporting pre-competitive R&D works
  Pre-competitive R&D works on issues of interest for the industrial partners gathered in the End-Users Group will be financially supported by the Network through grants to buy small equipement or finance non-permanent co-workers together with associated expenditures, within academic institutions. When promising, scale-up will be possible with industrial funding.
- Facilitating the emergence of promising collaborative projects
  By providing a broad forum for academic and industrial partners to exchange on mineralurgy and extractive metallurgy, this network will be a place to find the right partners to build consortia able to provide a holistic approach to raw material questions.
- Enabling innovation
  One trump card of this network is its capacity to support the further development of promising processes up to the pilot scale through facilitated access to the existing piloting platforms, which will be gathered into a platform network (see the MetNet RM-Commitment. EuROPEM will be closely linked to the European Institute of Hydrometallurgy (to be built from 2014 to 2017, see the EIH RM-Commitment).

**Description of the expected impacts:**

The successful creation of this mineralurgical and metallurgical research network would result in:
- Reinforcing the position of European industries on their traditional markets because even raw material production has turned from labour-intensive to knowledge intensive. But also allowing them to access new markets (like the recycling of high tech-products)
- Facilitate technology transfer from academia to industry by reinforcing synergism between these major stakeholders of innovation
- Cross fertilisation between extractive metallurgy and other important fields of activity in Europe.
For example metallurgy may benefit to chemistry (for example for natural substances extraction) or medicine (e.g. fast diagnostics). But cross fertilisation also works the other way round, for example new modelling tool facilitating operation in metallurgical plants and new business models issuing from other sectors may be implemented in processing plants.

- More young people coming back to science and technology to support the position of Europe as the world leading region in knowledge economy
- Better exchange of knowledge and good practices via bridges being built with scientific communities in Northern and Southern America, Australia, but also developing countries

**Expected innovation outcomes:**
- New processes
- New technologies
- New business models
- New ideas to the market
- Societal innovation

**Comments:**

Innovation is not only enabling new ideas to blossom in academic laboratories. Innovation is also helping these ideas to reach the market. By combining industrial interests and academic creativity this proposed network will boost Europe’s innovation potential. The Network will provide industry with a single access point to the European research potential in RM sciences and will provide academics with a facilitated access to the end-users able to boost their innovation potential.

**Name of the coordinating organisation:**
CEA
**Country:**
France

**Entity profile:**
Governmental/public body

**Role within the commitment:**
CEA will coordinate the network and act as the secretariat of the network. It includes among others the creation of the different bodies, the coordination of the actions of the network, the identification of financing opportunity, the dissemination, the communication and the education & training actions. CEA will also be involved in the R&D projects issuing from the network

**Other partners:**

**Name of partner:**
Amphos 21 Group/Enviromental Consultancy
**Country:**
Spain

**Entity profile:**
Private sector - SME

**Role within the commitment:**
To contribute with the group experience on applied R&D on mining and industrial waste management, as an interface between large corporations and R&D institutes
AURUBIS
Country:
Germany
Entity profile:
Private sector - large company
Role within the commitment:
AURUBIS is the leading integrated copper group and the world’s largest copper recycler. We produce some 1 million t of copper cathodes each year and from them a variety of copper products. Production expertise is our strength and the driving force of our success. AURUBIS will capitalize on its experience and know-how to contribute to the project.

Name of partner:
BRGM (French Geological Survey)
Country:
France
Entity profile:
Governmental/public body
Role within the commitment:
Partnership for the creation of the network. Contribution to joined marketing activities. Contribution to joined project using laboratory and pilot scale facilities in mineral processing and hydrometallurgy (including bio).

Name of partner:
CHALMERS
Country:
Sweden
Entity profile:
Academia
Role within the commitment:
CHALMERS will be involved as an R&D facility as well as for training activities

Name of partner:
ENEA, Italian Agency for new technologies, Energy and Sustainable economic development
Country:
Italy
Entity profile:
Governmental/public body
Role within the commitment:
expertise in the raw materials value chain (technologies and methodologies for waste valorization, integrated approaches for loop closure in production and consumption processes, development and realization of pre-industrial scale hydrometallurgical based pilot plants). links to other SIP actions: HLSG, Sherpa Group and OG1, OG2, OG3, OG4 of Raw Materials EIP. link to ERA-MIN through its participation as associate member and in the expert groups.

Name of partner:
Ecole Nationale Supérieure de Chimie Montpellier  
**Country:** France  
**Entity profile:** Academia  
**Role within the commitment:** ENSCM, through the “pôle de Chimie Balard” propose to join its expertise in the field of separation chemistry, for the development and the optimization of recycling processes. The aim is to organize the scientific community of Languedoc-Roussillon expanding intensifying collaborations between European academic research organizations and industry in order to promote the emergence of industrial clusters in the field of recycling.

**Name of partner:**  
ENSCP – IRCP (UMR CNRS 8247)  
**Country:** France  
**Entity profile:** Academia  
**Role within the commitment:** - organize scientific events to develop a network in hydrometallurgy - develop in-service trainees on mineral resources and processing based on their own experiences (CINCH EU project, existing courses and in-service training on hydrometallurgy at ENSCP) - participate in research programs on solvent extraction for hydrometallurgical processes in the framework of the present EU project

**Name of partner:**  
ERAMET  
**Country:** France  
**Entity profile:** Private sector - large company  
**Role within the commitment:** ERAMET is a mining & metallurgical company operating beneficiation, pyrometallurgy and hydrometallurgy plants worldwide. At ERAMET Research, the performance of operating processes are being improved and new metallurgical processes are being developed to extract valuable metals from a resource whether primary or secondary ERAMET & ERAMET Research will capitalize on its experience and know-how

**Name of partner:**  
IDENER (Optimización orientada a la sostenibilidad S.L.)  
**Country:** Spain  
**Entity profile:** Private sector - SME  
**Role within the commitment:**
- Link the academia and industry sectors - Provide its background related to control and process optimisation issues. Working Group devoted to “Processes control and optimization” - Provide its background related to hydrometallurgical processes. Working Group related to “Hydrometallurgical techniques” - Act as link between EuROPEM and the European Institute of Hydrometallurgy

**Name of partner:**
Instytut Metali Niezelaznych (Institute of Non-Ferrous Metals)

**Country:**
France

**Entity profile:**
Governmental/public body

**Role within the commitment:**
Partnership in creation of the network, running activities related to scientific laboratory studies into ore treatment and metallurgical metal recovery

**Name of partner:**
Grenoble-INP/LEPMI

**Country:**
France

**Entity profile:**
Academia

**Role within the commitment:**
Fundamental researches in order to experience new routes for extraction and metal recycling (application to waste treatments from urban mines) : from understanding of elementary mechanisms to chemical and electrochemical engineering design Feasability studies on small pilots at the laboratory scale

**Name of partner:**
INSTITUT NATIONAL POLYTECHNIQUE DE TOULOUSE (INPT)

**Country:**
France

**Entity profile:**
Academia

**Role within the commitment:**
Fundamental researches in order to experience new routes for extraction and metal recycling (application to waste treatments from urban mines) : from understanding of elementary mechanisms to chemical and electrochemical engineering design Feasability studies on small pilots at the laboratory scale

**Name of partner:**
KU Leuven

**Country:**
Belgium

**Entity profile:**
Academia
Role within the commitment:
contribute to the reasearch and T&E activities of the network

Name of partner:
Luleå University of Technology
Country:
Sweden
Entity profile:
Academia
Role within the commitment:
Participation in pre-competitive R&D work in the areas of mineral processing and extractive metallurgy including both pyro- and hydrometallurgy.

Name of partner:
Technical University Crete, School Mineral Resources Engineering (TUC)
Country:
Greece
Entity profile:
Academia
Role within the commitment:
R&D activities, development / improvement of (bio)hydrometallurgical processes for the recovery of metals (including rare/strategic ones) from low grade ores, mining and metallurgical wastes, waste management and valorization, application of advanced characterization and environmental techniques, risk and LCA studies, development of training courses, preparation with other network members of collaborative projects

Name of partner:
Politecnico di Milano / University
Country:
Italy
Entity profile:
Academia
Role within the commitment:
Politecnico di Milano is a research academic site of reference for the Italian industrial districts and will contribute with fundamental and technological knowledge in chemistry, materials and chemical engineering. The groups involved have experience in advanced materials for energy production and environmental applications; electrochemical engineering of metals, and extractive metallurgy; Life Cycle Assessment of materials and process.

Name of partner:
RWTH Aachen University/IME “Process Metallurgy and Metal Recycling Institute”
Country:
Germany
Entity profile:
Academia
Role within the commitment:
IME will participate in some activities of WP ? and WP ?. This participation contributes lab scale and demo plant scale experiments, theoretical research to expand the knowledge.

Name of partner:
Swerea MEFOS
Country:
Sweden
Entity profile:
Other
Other:
Swerea MEFOS coordinates the raw materials commitment, MetNet, an independent and collaborative network to provide services & facilities for up-scaling of metallurgical and mineral processes in Europe.
Role within the commitment:
Participating in discussions with the users-group to submit precompetitive R&D issues to the academics

Name of partner:
Tasman Metals
Country:
Sweden
Entity profile:
Private sector - SME
Role within the commitment:
Tasman Metals AB is the Swedish subsidiary of Tasman Metals Ltd. Tasman Ltd is a Canadian mineral exploration and development company focused on Strategic Metals in the European region (Sweden). At the moment Tasman is working with the development of the Norra Kärr project, Sweden, an advanced REE project in mainland Europe. Tasman will contribute with experience from the development of a mining project in Europe focused on mining and extrating REEs.

Name of partner:
Delft University of Technology (TU Delft)
Country:
Netherlands
Entity profile:
Academia
Role within the commitment:
Education, research and development in new and alternative hydrometallurgical processes.

Name of partner:
Technical University, Faculty of Metallurgy, Department of Non-ferrous Metallurgy
Country:
Slovakia

Entity profile: Academia

Role within the commitment:
One pillar of the implementation of the RW Initiative is boosting resource efficiency and recycling. In accordance, our workplace is focused on hydrometallurgical extraction of metals from primary and secondary raw materials using extraction procedures such as: pretreatment of raw materials, leaching, chemical precipitation, electrowinning, electrolytic refining, solvent extraction and so on.

Name of partner: Umicore
Country: Belgium
Entity profile: Private sector - large company

Role within the commitment:
Umicore will act as member of the users-group: • Umicore’s expertise in extractive metallurgy and metal recycling can support the development of strong pre-competitive research projects.

Name of partner: Université de Lorraine
Country: France
Entity profile: Academia

Role within the commitment:
contribute to R&D projects and T&E activities

Name of partner: US-DIQA (Chemical Engineering and Environmental Department- University of Seville)
Country: Spain
Entity profile: Academia

Role within the commitment:
Within EUROPETM DIQA-US is committed to: - Provide its background related to waste analysis, valorization and treatment. - Provide its background related to hydrometallurgical processes by participating in the Working Group related to “Hydrometallurgical techniques”.

Name of partner: CNRS, Institut des Sciences de la Terre Grenoble
Country: France
Entity profile:
Governmental/public body

**Role within the commitment:**
contribute to R&D project and T&E activities

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**Name of partner:**
VITO Vision on Technology

**Country:**
Belgium

**Entity profile:**
Other

**Role within the commitment:**
Expertise on separation and recovery of valuable and critical raw materials (e.g. metals) from industrial residues by hydrometallurgical routes with the aim to recycle both the recovered metals as well as the matrix material. This approach requires innovative processes in which we provide: (i) physical separation technology with a focus on fine grained (mineral) materials; (ii) hydrometallurgical separation by state-of-the-art equipment and techniques; and (iii) hydrometallurgical recovery by electrochemical selective recovery of critical metals from (leaching) solutions using bio- or chemical catalysts.

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**Name of partner:**
VTT Technical Research Centre of Finland

**Country:**
Finland

**Entity profile:**
Governmental/public body

**Role within the commitment:**
Part of the research network planned for EIH commitment.

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**Name of partner:**
Wroclaw University of Technology, Faculty of Chemistry

**Country:**
Poland

**Entity profile:**
Academia

**Role within the commitment:**
Material characterization for hydrometallurgical treatment. Non-oxidative, atmospheric and pressure leaching of metal-bearing solid materials (ores, by-products, concentrates). PLS purification and metals separation by means of SX and IX. Recovering of metals using EW and precipitation under the hydrogen pressure. Hydrothermal operations of iron precipitation and arsenic stabilisation from PLS. Chloride leaching and recovering of Pb and Ag.

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**Existing EU contribution:**
No

**Period to implement the commitment:**