Application for a Raw Materials Commitment

Creation of a European Hydrometallurgical Institute

Acronym:
EHI

Links to the Strategic Implementation Plan:
- **I. Technology Pillar**
  - 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
      - 2) Metallurgical systems

Objectives of the commitment:

1. To create an independent service provider for up-scaling and integrating hydrometallurgical processes:
   Up-scaling facilities in ore-processing and pyrometallurgy already exist in Europe. Their expertise enables innovation in primary and secondary raw materials’ production in Europe. To propose a full technological offer, an open hydrometallurgical pilot facility is required.

2. Enable access to low grade, polymetallic resources in Europe:
   Primary and secondary resources in Europe are often complex and difficult to valorize. There is a need to foster innovation in extractive metallurgy to access these resources.

3. Developing eco-concieved extractive processes:
   In a context of increased awareness to environmental issues, innovative hydrometallurgical processes need to maximize resource efficiency, to minimize their carbon and water foot-print, to produce safe effluents and solid wastes.

Description of the activities:

Since the mid-2000s, raw materials issues have attracted a renewed attention in Europe. Indeed European Countries and the EU itself have realised how dependent they were on foreign imports to access non energetic raw materials. This dependence is a threat to Europe’s industrial network and global competitiveness. In parallel, owing to the presence in Europe of valuable sources of such minerals, new market opportunities in this field may strengthen economic growth in Europe.

Production of metals is capital intensive and failed investments in production facilities can lead to disasters. To minimize risks and to develop efficient processes, pilot plant trials are of critical
importance. A pilot plant is a facility where process, equipment and process parameters can be integrated and tested at a certain scale (for hydrometallurgy typical throughput figures go from a few litres per hour up to a hundred litres per hour). The aim of process development at pilot scale is to enhance technical and economical performances, to lessen environmental impacts and to provide required data to decide whether to enter full scale industrialisation. Consequently, access to a pilot facility is necessary to bring innovative ideas or concepts into industrial use, i.e. “Crossing the valley of death”.

In Europe, there exist several metallurgical and mineral processing pilot plants covering many different aspects of mineral processing, metallurgy and production of metals including Critical Raw Materials (SRMs).

Among the available technological families enabling the valorisation of CRMs, hydrometallurgy is considered as an important part of the processing tool-box. Unfortunately, in Europe, there is no hydrometallurgical equivalent available to the piloting service providers in mineralurgy (such as GTK Mintek in Finland) or in pyrometallurgy (such as SWEREA-MEFOS in Sweden).

This commitment thus aims at the creation of such a pilot development facility, which should:
i- be able to operate from 1 to 50l/h; 24/7 up to 12 weeks in a row
ii- be a tool to pilot complete processes starting from mineralurgical concentrates or secondary raw materials, ending with purified metals and waste streams

To do so the Institute will operate piloting platforms:
i- consisting in about 1000m² of labs and 2000m² of piloting halls
ii- offering access to the main hydrometallurgical techniques, including: leaching, bioleaching, precipitation, solvent extraction, electro-winning, etc.
iii- possessing their own analytic and research laboratory
iv- offering simulation tools to get more value from the tests’ results and to facilitate further up-scaling

The created facility will be part of the pilot facility platform described by the MetNet commitment and lean, for its R&D needs, on the research network described in the EurOPEM commitment.

Activities;
To achieve its goals this commitment encompasses the following activities:
1. Identification of user’s needs (2014-2015):
i- Map the needed techniques to respond to the projects of the future partners and customers
ii- Identify the best working practices to create a successful facility

2. Search for funding (from 2014)
i- Search for direct regional, national and EU support
ii- Search for industrial shareholders
iii- Collaborative projects and R&D services

i- Acquisition of the needed equipment
ii- Building of a first platform (2015)
iii- Building of the complete institute (2017)

4. Operation (from 2015)
i- Starting ASAP in an existing building
ii- Progressively developing the capacity and the service offer
Description of the expected impacts:

1. Minimising risk for industrial investments:
Building a new extraction plant or implementing a new extraction process is very capital intensive (typical figures reach billions of Euros) and the risks involved are very high. The ability to safely bring projects from low to high TRLs (Technology Readiness Levels) is crucial for the successful development of new projects, the sustainable access to new raw materials or the safe implementation of innovative processes. The EHI will provide such opportunity for the European industrial community.

2. Faster industrialisation:
Numerous good ideas are doomed to stay in the drawer of creative scientists because they never have a chance to get access to up-scaling facilities. To help more low TRL projects to grow in TRL, the EHI will devote part of its piloting time to projects issuing form the EuROPEM research network (see corresponding RM-commitment).

3. More social acceptance for metallurgical activities:
Due to land use policies, industrial sites in Europe are a scarce resource. Moreover, they are often located close to populated areas. The development of new plants and investments in existing plants won’t therefore be possible without sufficient public support. The latter requires (amongst others) the development of cleaner and safer processes, hence the necessary development tools for these processes, such as pilot test facilities.

4. More value and job creation in Europe:
The purpose of this commitment is not just to address a threat to our high-tech industry. It is also an opportunity to create new metallurgical companies and to develop the activities of the existing ones. Allowing piloting to take place in Europe will develop the skills European professionals create know-how in Europe.

Expected innovation outcomes:
New processes
New services
New ideas to the market

Comments:
The EHI (within the MetNet network) will offer a holistic approach to metal production. Its comprehensive service will provide more scalability for its clients’ business and enable them to minimize their financial and industrial risks:

i- Established industrial players will beneficiate from the EHI task force as well as from the EHI’s academic network. The EHI will be their dedicated trouble shooting and innovation acceleration tool.

ii- For SMEs, the EHI will be a partner to test their ideas (be they extraction processes, new equipment, waste treatment processes, etc.) at realistic conditions so to reduce time-to-market.

iii- Academic research institutions will have privileged access to EHI facilities, via the EuROPEM Network. This will broaden the pool of mature technologies available to industrial companies.

-> The EHI will thus contribute to a more innovation friendly environment in Europe.

Name of the coordinating organisation:
CEA

Country:
France

Entity profile:
Governmental/public body

Role within the commitment:
CEA will act as the coordinating partner of this project. It will be responsible for building the consortium, identifying the needs, searching the needed financial support, designing and building the most appropriate technical solution.

Other partners:

Name of partner: BRGM (French Geological Survey)  
Country: France  
Entity profile: Governmental/public body  
Role within the commitment: Contribution to joined R&D project, using BRGM laboratory and pilot scale facilities in mineral processing and hydrometallurgy (including bio) as one step in the scaling up of project that will be demonstrated in the IEH. Expertise in support of the IEH R&D and demonstration activities.

Name of partner: Eramet  
Country: France  
Entity profile: Private sector - large company  
Role within the commitment: Services, support and consultation related to design, implementation and operation of the new pilot facilities.

Name of partner: Région Languedoc-Roussillon  
Country: France  
Entity profile: Governmental/public body  
Role within the commitment: Political, technical and financial support.

Name of partner: 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. Please note that all
the contributions are to be considered as indicative and cannot be regarded as legally binding.

Name of partner: 
Umicore 
Country: 
Belgium 
Entity profile: 
Private sector - large company 
Role within the commitment: 
Umicore will actively contribute as a delivery partner: • Umicore’s experts in hydrometallurgical experimentation at pilot scale level can be involved in the process engineering and the guidance regarding equipment selection (size, unit operations, construction materials) of the planned pilot facilities.

Name of partner: 
Outotec 
Country: 
Finland 
Entity profile: 
Private sector - large company 
Role within the commitment: 
Services, support and consultation related to design, implementation and operation of the new pilot facilities including flowsheet development and equipment design and delivery.

Name of partner: 
VTT 
Country: 
Finland 
Entity profile: 
Governmental/public body 
Role within the commitment: 
Part of the research network planed for EHI commitment. Support for plans to build pilot facilities in EU. Innovative hydrometallurgical and bioprocesing concepts and hybrid method development for different raw materials including complex and low grade resources. Environmental aspect and resource efficiency. Wastes and byproducts characterization and treatment. Landfills.

Name of partner: 
Idener 
Country: 
Spain 
Entity profile: 
Private sector - SME 
Role within the commitment: 

Study of the Germanium recovery process through the development of the corresponding hydrometallurgical techniques (leaching, ion exchange...) and the optimization of the process aiming resource efficiency. - Creation and operation of International project office aimed to create new international opportunities for the EHI, looking for new projects (EU or other international funding opportunities as well as private projects) and partners as well as dissemination activities through the corresponding sector.

**Name of partner:**
SIEMCALSA (Sociedad de Investigación y Explotación Minera de Castilla y León, S.A.)

**Country:**
Spain

**Entity profile:**
Private sector - SME

**Role within the commitment:**
SIEMCALSA is developing several exploration mining projects, in its own mining rights, on W, Sn, polymetallics (Cu, Zn, Ag, Sn, W), Pb-Zn and Cu-Co-Ni-Au. Metallurgical testworks are been carried out in some of these projects.

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

**Country:**
Poland

**Entity profile:**
Governmental/public body

**Role within the commitment:**
Identification of the best practices, running activities related to laboratory studies, design of the pilot facility, supervision and consulting during the construction phase, running pilot scale studies and verification of the results.

**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. Re-covering 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.

**Name of partner:**
Lulea Technical University

**Country:**
Sweden
Entity profile:
Academia

Role within the commitment:
Participation in search for funding and helping in discussions on design and equipment needed for the plant.

Existing EU contribution:
No

Period to implement the commitment:
Wednesday, 1 January, 2014 to Wednesday, 1 January, 2020