European Innovation Partnership on Raw Materials

Application for a Raw Materials Commitment

**Enabling the recovery of metals and other valuable materials from mine waste slurries**

Acronym:
TailingsDamScavenger

Abstract / executive summary:

Due to geological variety and the continuous nature of minerals’ processing plants, tailings dams normally contain large quantities of metals and other valuable elements that could have been recovered. This project aims to define response mechanisms allowing the separate collection of mine waste slurries enriched with metals based in the integration of real time data from mineral processing plants, instruments and inspection activities. This will be done by combining data gathering using device to device communications and data treatment using predictive heuristics. The separate collection of slurries enriched with metals will optimize materials recovery, contributing to increase the lifetime and safety of tailing dams. This will have important positive impacts on social and environmental dimensions (by minimizing the need for new mines and larger tailings dams) alongside with enhanced mine profitability.

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

- **II. Non-Technology Pillar**
  - II.B Priority Area: Improving Europe’s waste management framework conditions and excellence
    - Action area n° II.4: Product design for optimised use of (critical) raw materials and increased quality of recycling
      - 3) Critical Raw Materials in product and waste flows
    - Action area n° II.5: Optimised waste flows for increased recycling
      - 2) Landfill ban for recyclable waste and incineration ban for certain waste
      - 3) Waste collection systems and Extended Producer Responsibility (EPR) Schemes

Coverage of the Action Areas referred to above:

This project uses innovative and flexible processing tools (I.B.4) to recover critical raw materials
(IIB4) and other valuable elements from mine waste slurries, thus preventing the deposition of recyclable waste (IIB5) in tailings dams.

**Objectives of the commitment:**

Develop a system based on the integration of data from several sources (from processing operations and mine water treatment systems to visual inspections) using device to device communications, that monitors the above mentioned waste flows, triggering alerts and recommendations allowing the separate collection of slurries enriched with metals for further processing.  
Contribute to safe long term maintenance of tailing dams.  
Test and adapt equipment for collection of data from mining waste flows feeding tailings dams.

**Description of the activities:**

A tailings dam is an earth-fill embankment dam used to store waste from mining operations after separating the valuable fraction from the uneconomic fraction of an ore. The waste is often in the form of slurry, and its composition depends on the nature of the rock and minerals being mined and on recovery processes used.  
Tailing dams are designed for permanent containment of mining wastes but, especially in metal mines, may contain large quantities of metals and other valuable elements that could have been recovered. This happens for two main reasons: 1) no recovery process is 100% efficient, capable of capturing all target elements mined; and 2) changes in the chemical nature of the run of mine materials unbalance the line treatment process and, until the adequate readjustment in the process is made, the waste flow carries valuable elements that should have been captured.  
Unfortunately, due to geological variety and the continuous nature of minerals’ processing plants, the reason 2) above is frequent, and mineral processing is a dynamic (continuously rebalancing) activity, in an effort to accommodate feed-in changing conditions.  
In this context, the routing of metals, or other valuable elements that could have been recovered, to tailing dams is frequent. This not only poses problems to mine profitability, but also depreciates the tailings dam itself, diminishing its capacity and lifetime. For society, this impact is also negative, fostering the need for more mines and bigger and difficult to maintain tailing dams, with the correspondent economic, environmental and social losses.  
The TailingsDamScavenger system will integrate real time data from mineral processing, water treatment and waste monitoring with data from instruments and inspection activities to define response mechanisms allowing the separate collection of slurries enriched with metals and alert levels that will optimize materials recovery, contributing to increase the lifetime and safety of tailing dams. This system will run in a web base application enabling, from the start, combination of data gathering using device to device communications and data treatment using predictive heuristics.  
This will support the definition of several levels of warning, alert messages and actions, tailored to different stakeholders.

**Description of the expected impacts:**

TailingsDamScavenger will enable the recovery of metals and other valuable materials from mine waste slurries, contributing to increase the efficiency of industrial ore treatment processes. This will bring positive impacts on mining companies’ competitiveness, but also on society and environment policies, by diminishing the need for new mines and more and bigger tailing dams.

**Expected innovation outcomes:**

- New processes
- New technologies
- New ideas to the market
Societal innovation

Comments:

The effective gathering and integration of real time data on waste streams and tailings dams using device to device communications, combined with predictive heuristics, will enable better decision making, with relevant positive impacts on the natural ecosystems and society. This will enhance the efficient use of raw materials, with economic advantages that will trigger an industry response and the dissemination of sustainable practices in mining and waste treatment.

Name of the coordinating organisation:
LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL
Country:
Portugal
Entity profile:
Governmental/public body
Role within the commitment:
Coordinator, in charge of building up and testing a real time information system on mining waste flows (to tailings dams).

Other partners:

Name of partner:
EUROPEAN FEDERATION OF GEOLOGISTS
Country:
Europe
Entity profile:
NGOs
Role within the commitment:
Partner in charge of dissemination, coordinating communication with EFG’s 24 National Associations in Europe and several over-seas counterparts.

Name of partner:
GEOPLANO CONSULTORES, S.A.
Country:
Portugal
Entity profile:
Private sector - SME
Role within the commitment:
Partner in charge of field instrumentation and testing of the TailingsDamScavenger in operating mines.

Name of partner:
MINPOL
Country:
Austria
Entity profile:
Private sector - SME
Role within the commitment:
Partner in charge of recommendations on policies concerning raw materials sourcing from secondary sources.

Existing EU contribution:
No

Period to implement the commitment:
Tuesday, 1 November, 2016 to Thursday, 31 October, 2019