ITERAMS

Integrated mineral technologies for more sustainable raw material supply.

Integrated Mineral Technologies for More Sustainable Raw Material Supply

DELIVERABLE D7.1 REPORT "CLUSTERING PRIORITIES, GOALS, TASKS AND MAIN CONTACT POINTS IDENTIFIED", M6 (VTT)

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D7.1: Clustering priorities, goals, tasks and main contact points identified

SUMMARY

This report includes the identifying and contacting the EU funded projects within this topic to form a project cluster. Also mutual documents for the cluster working groups related to sustainability and communication with local communities have been initiated. Preliminary discussions about the clustering meetings have been also initiated.

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1. SUMMARY OF THE CLUSTERING PROJECTS

1.1 Clustering projects identified within SC5-13 2016 call

We have identified five projects in addition to ITERAMS that started at the same time with ITERAMS project in the SC5-13 call in 2016. In addition, there are common topics with the METGROW+ project under the call SC5-11e. The summary of the projets is listed in table 1-1 below:

Table 1-1 Summary of projects identified from SC5-13 (2016) call

Project long name	Short name	Contact person(s)	Start date and duration
Integrated mineral technologies for more sustainable raw material supply	ITERAMS	Teknologian Tutkimuskeskus VTT Oy, coordinator: Päivi Kinnunen, email: paivi.kinnunen@vtt.fi	6/2017, 36 months
Sustainable Low Impact Mining solution for exploitation of small mineral deposits based on advanced rock blasting and environmental technologies	SLIM	UNIVERSIDAD POLITECNICA DE MADRID, coordinator: José Sanchidrián email: ja.sanchidrian@upm.es	11/2016, 48 month
Integrated Modular Plant and Containerised Tools for Selective, Low-impact Mining of Small High-grade Deposits	IMPACT	THE UNIVERSITY OF EXETER, coordinator: Kathryn Moore, email: K.Moore@exeter.ac.uk PI/project manager: Dana Finch, email: D.Finch3@exeter.ac.uk	12/2016, 42 months
efficient mineral processing and Hydrometallurgical RecOvery of by-product Metals from low-grade metal contalning seCondary raw materials	CHROMIC	VITO, coordinator: Liesbeth Horckmans, email: liesbeth.horckmans@vito.be	11/2016, 48 months
Production of Scandium compounds and Scandium Aluminum alloys from European metallurgical by-products	SCALE	ALOUMINION TIS ELLADOS VIOMICHANIKI KAI EMPORIKI ANONYMOS ETAIREIA VEAE, coordinator: Thymis Balomenos, email: thymis@metal.ntua.gr	12/2016, 48 months
PLATInum group metals Recovery Using Secondary raw materials	PLATIRUS	FUNDACION TECNALIA RESEARCH & INNOVATION, coordinator: Amal Sriwardana, email: Amal.Sriwardana@tecnalia.com	11/2016, 48 months
Metal Recovery from Low Grade Ores and Wastes Plus	METGROW+	Teknologian Tutkimuskeskus VTT Oy, coordinator: Päivi Kinnunen, email: paivi.kinnunen@vtt.fi	2/2016, 48 months

2. THE CLUSTERING PROJECTS AND THEIR CONSORTIUM

ITERAMS

ITERAMS-project "Integrated mineral technologies for more sustainable raw material supply" focuses on the isolation of process waters completely from the adjacent water systems. This will require development of new methods for optimising and controlling water qualities at each process step. ITERAMS will also demonstrate the use of geopolymerisation to create water and oxygen tight covers on the deposited tailings. For that, the tailings streams will be modified for their easier geopolymerisation. The ITERAMS water and waste efficient methods will be validated at mine sites in Finland, in Portugal and additionally either in Chile or South Africa.

The project partners are:

1 Teknologian tutkimuskeskus VTT Oy VTT Finland
2 OUTOTEC OYJ OT Finland
3 BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES BRGM France
4 MONTANUNIVERSITAT LEOBEN MUL Austria
5 BOLIDEN KEVITSA MINING OY BK Finland
6 HACETTEPE MINERAL TECHNOLOGIES LTD HMT Turkey
7 OULUN YLIOPISTO UOULU Finland
8 GREENDELTA GMBH GD Germany
9 IMA ENGINEERING LTD OY IMA Finland
10 ANGLO AMERICAN PLC AAL United Kingdom
11 AALTO-KORKEAKOULUSAATIO AALTO Finland
12 UNIVERSITY OF CAPE TOWN UCT South Africa
13 CASPEO SARL CAS France
14 LAPPEENRANNAN TEKNILLINEN YLIOPISTO LUT Finland
15 AMPHOS 21 CONSULTING SL AMP21C Spain
16 SOMINCOR - SOCIEDADE MINEIRA DE NEVES-CORVO SA SMNC Portugal

SLIM

SLIM -project "Sustainable Low Impact Mining solution for exploitation of small mineral deposits based on advanced rock blasting and environmental technologies" aims to develop a cost-effective and sustainable selective low impact mining solution based on non-linear rock mass fragmentation by blasting models, airborne particulate matter, vibration affections and nitrate leaching mitigation actions for exploitation of small mineral deposits (including those with chemically complex ore-forming phases) through a new generation of explosives and an advanced automatic blast design software based on improved rock mass characterisation and fragmentation models for optimum fragmentation and minimum rock damage and far-field vibrations.

The project partners are:

17 UNIVERSIDAD POLITECNICA DE MADRID (coordinator, José Sanchidrián, email: ja.sanchidrian@upm.es)
18 3GSM GmbH
19 BENITO ARNO E HIJOS SA
20 BRGM
21 VA ERZBERG GMBH
22 INVESTORNET-GATE2GROWTH APS
23 LULEA TEKNISKA UNIVERSITET
24 MAXAM CORP INTERNATIONAL SL
25 MINPOL GMBH
26 MONTANUNIVERSITAT LEOBEN
27 MINERA DE ORGIVA SL
28 TECHNISCHE UNIVERSITAET GRAZ
29 ZABALA INNOVATION CONSULTING, S.A.

IMPaCT

IMPaCT -project "Integrated Modular Plant and Containerised Tools for Selective, Low-impact Mining of Small High-grade Deposits" proposes a solution that develops a new switch on-switch off (SOSO) mining paradigm to improve the viability of many critical metal and other small complex deposits.

The project partners are:

1 THE UNIVERSITY OF EXETER (coordinator, Kathryn Moore, email: K.Moore@exeter.ac.uk; PI/project manager, Dana Finch, email: D.Finch3@exeter.ac.uk, media contact: Duncan Sandes, email: d.sandes@exeter.ac.uk)
2 BRGM
3 MINECO LIMITED
4 RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
5 IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE
6 EXTRACTHIVE
7 GLOBAL ECOPROCESS SERVICES OY
8 CYMRU COAL LIMITED
9 RADOS INTERNATIONAL SERVICES LTD
10 ITA-SUOMEN YLIOPISTO

CHROMIC

CHROMIC-project "effiCient mineral processing and Hydrometallurgical RecOvery of by-product Metals from low-grade metal contalning seCondary raw materials". By smart combinations of existing methods and new technological innovations, CHROMIC will develop new processes to recover chromium, vanadium, molybdenum and niobium from industrial waste. (stainless steel slags and ferrochrome slags)

The project partners are:

1 VITO (coordinator, Liesbeth Horckmans, email: liesbeth.horckmans@vito.be)
2 MICROWAVE ENERGY APPLICATIONS MANAGEMENT
3 ELEKTROWERK WEISWEILER GMBH
4 RECMIX BELGIUM BVBA
5 FORMICABLU SRL
6 ARCHE
7 TECHNICKA UNIVERZITA V KOSICIACH
8 HELMHOLTZ-ZENTRUM DRESDEN-ROSSENDORF EV
9 VDEH-BETRIEBSFORSCHUNGSINSTITUT GMBH
10 INSTITUT FUR BAUSTOFF-FORSCHUNG EV
11 BRGM

SCALE

SCALE-project "Production of Scandium compounds and Scandium Aluminum alloys from European metallurgical by- products". The main aim of the SCALE project is the efficient exploitation of EU high concentration Sc containing secondary resources including Bauxite Residues (BR) resulting from alumina production and acid wastes from TiO2 pigment production to develop a stable and secure EU scandium supply chain to serve the needs of EU aerospace and high tech industry.

The project partners are:

1 ALOUMINION TIS ELLADOS VIOMICHANIKI KAI EMPORIKI ANONYMOS ETAIREIA VEAE (coordinator: Thymis Balomenos, email: thymis@metal.ntua.gr)
2 II-VI DEUTSCHLAND GMBH
3 NATIONAL TECHNICAL UNIVERSITY OF ATHENS – NTUA
4 RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
5 KUNGLIGA TEKNISKA HOEGSKOLAN
6 BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM
7 BUNDESANSTALT FUER MATERIALFORSCHUNG UND –PRUEFUNG
8 FACHHOCHSCHULE NORDWESTSCHWEIZ
9 FRAUNHOFER
10 MEAB CHEMIE TECHNIK GMBH
11 STIFTELSEN SINTEF Norway
12 IOLITEC IONIC LIQUIDS TECHNOLOGIES GMBH Germany
13 KBM MASTER ALLOYS BV
14 AIRBUS DEFENCE AND SPACE GMBH
15 LESS COMMON METALS LIMITED
16 TRONOX PIGMENTS (HOLLAND) BV
17 ALUMINIUM OXID STADE, GESELLSCHAFT MIT BESCHRANKTER HAFTUNG

PLATIRUS

PLATIRUS-project's "PLATInum group metals Recovery Using Secondary raw materials" key target is to realise a significant contribution to bridge the supply gap of PGMs in Europe, by fostering the development of novel or improved secondary materials to PGM recovery supply chains from autocatalysts, mining and electronic wastes.

The project partners are:

1 FUNDACION TECNALIA RESEARCH & INNOVATION (coordinator: Amal Sriwardana, email: Amal.Sriwardana@tecnalia.com)
2 MONOLITHOS KATALITES KE ANAKIKLOSI ETAIREIA PERIORISMENIS EVTHINIS
3 KATHOLIEKE UNIVERSITEIT LEUVEN
4 TECHNISCHE UNIVERSITAET WIEN
5 VITO
6 STIFTELSEN SINTEF
7 CENTRO RICERCHE FIAT SCPA
8 FORD OTOMOTIV SANAYI ANONIM SIRKETI
9 BOLIDEN HARJAVALTA OY
10 JOHNSON MATTHEY PLC
11 Env-Aqua Solutions Ltd
12 PNO INNOVATION

METGROW+

The primary objective of METGROW+ is to create, demonstrate and validate an industrially viable and flexible New Metallurgical Systems Toolbox, which allows to smartly combine pyro-, hydro-, electro-, bio-, solvo and ionometallurgical unit operations, as well as all residual matrix valorisation technologies, to valorise EU's low-grade, polymetallic primary and secondary resources. Aside from sources selected in the project (nickel-cobalt laterite deposits, iron-rich sludges from the zinc industry, zinc- and chromium-rich sludges, fayalitic slags from non-ferrous metallurgy), the METGROW+ toolbox has been conceived so as to be able to provide a processing solution for other low-grade sources.

The project partners are:

1 Teknologian tutkimuskeskus VTT Oy (coordinator: Päivi Kinnunen, email: Paivi.Kinnunen@vtt.fi)
2 ARCHE CVBA
3 OPTIMIZACION ORIENTADA A LA SOSTENIBILIDAD SL
4 IDP INGENIERIA Y ARQUITECTURA IBERIA SL
5 INSTYTUT METALI NIEZELAZNYCH
6 KATHOLIEKE UNIVERSITEIT LEUVEN
7 JM RECYCLING NV
8 Outotec (Finland) Oy
9 RISE RESEARCH INSTITUTES OF SWEDEN AB
10 FUNDACION TECNALIA RESEARCH & INNOVATION
11 THE RESEARCH COMMITTEE OF THE TECHNICAL UNIVERSITY OF CRETE
12 UNIVERSITEIT GENT
13 VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.
14 HELLENIC COPPER MINES LTD
15 URBASER S.A.
16 PROFIMA Sp. z o.o.
17 UMICORE
18 RINA CONSULTING SPA
19 KERNEOS

3. CLUSTERING MEETINGS AND OTHER ACTIVITIES

ITERAMS-project identified and contacted the projects that were financed from the same call. Subsequently, the projects have organized Skype meetings (1.6.2017, 7.6.2017, 30.6.2017 and 17.11.2017) called together by PLATIRUS-project. The Skype meeting can be used to organize a mid-term meeting and more frequent information exchange meetings. The aim has also been to find a time and date for a mutual face-to-face meeting for clustering. Additionally, the consensus has been to find mutual more specific topics to discuss.

The clustering deliverables are quite different for each project, but from the perspective for ITERAMS project we have suggested to create working groups for two selected topics.

Common dissemination booster (CDB) service was requested from EC by ITERAMS project, but the request was placed in reserve position to wait for new call and funding.

VTT as ITERAMS coordinator participates in the Cluster event for ongoing mining projects funded by Horizon 2020 organized by the European Commission 12.12.2017.

4. WORKING GROUP TOPICS OF MUTUAL INTEREST

ITERAMS project has introduced two working group topics for the project cluster:

1) Sustainability concepts in mining, and
2) Communication with local communities

ITERAMS has prepared a template for all projects to fill, which enables to collect experiences from the whole cluster related to the selected topics above. The templates will be published in the next project clusters Skype meeting, which is scheduled for January.

4.1 ITERAMS initial working group document for the topic "Sustainability concepts in mining"

Clustering Document: Sustainability Concepts in Mining

As collection from the project ITERAMS in cluster with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials

Authors: Andreas Ciroth, Mika Paajanen November 2017

Project name, grant, website: ITERAMS, grant agreement number 730480, www.iterams.eu/

Point of contact for sustainability: Andreas Ciroth, ciroth@greendelta.com, lead WP Sustainability

Goals and idea of the project related to sustainability: why a sustainability assessment:

The ITERAMS projects pursues the following goals which are closely linked to sustainability:

1. To isolate the process water use completely from the adjacent water system. The target is to reduce water consumption of the mining sites by at least by 90%, compared to current best practices, when applying the novel ITERAMS knowledge and technologies developed.

2. To develop efficient and cost efficient water treatment methods to improve plant water quality to acceptable levels for good operational efficiency for processing steps having similar water quality requirements.

3. To develop economic water quality control methods to achieve the required quality characteristics.

4. To develop a test protocol for designing closed water loop systems applicable for chosen types of sulphide ores.

5. To minimise the use of energy, water and consumables in relation to final valuable products by physically manipulating the mill feed stream properties.

6. To have a remarkable portion of waste rock and tailings either used for added revenue

either as hardening mine fill or sold as products and to safely deposit all remaining tailings

as filtered solids under a landscaped cap having very low water penetration and oxygen

diffusion

In a broader view, closing the water cycle in the mine as much as possible reduces the water demand of the mine, and also the waste water produced, which in turn has promising effects on local water availability and reduces risks from stored water induced by dam breaks and floodings. From the water treatment, it is expected to obtain also geopolymers, or geopolymer "precursors" which can be used in the mine operation for covering tailings for example. On the other side, it is worth investigating what kind of impacts are created by establishing and running the closed water cycle, including the required water cleaning, how effective the systems works in real plants, i.e. how far it is possible to close the water cycle and run the system over longer time, and how well the geopolymer "precursors" can be used to replace concrete and other materials, and of course again, what the effects on sustainability are.

Aspects of sustainability foreseen to be covered, is a life cycle approach followed?

ITERAMS covers social, environmental, and economic sustainability. All are considered both in a detailed, local assessment, and over the entire life cycle, which means that also impacts from electricity, chemicals used in water treatment, and transport impacts are included.

For the assessment, impacts on the following areas will be considered:

- Social: local community impacts
- Social: Worker impacts
- Environment: Land use impacts
- Environment: Resources impacts
- Environment: Human health impacts
- Environment: Ecosystem impacts
- Economic: Life cycle costs

How are risk and chance dealt with in the assessment

ITERAMS foresees to perform a risk-based assessment for the local site in addition to a life cycle based assessment.

Overall structure of sustainability assessment in the project

ITERAMS performs the following tasks for sustainability assessment:

- Sustainability hot spot screening
- Sustainability Assessment goal and scope
- LCSA foreground modelling
- Life cycle modelling
- Sustainability assessment result interpretation

4.2 ITERAMS initial working group document for the topic "Communication with local communities"

Clustering Document: Communication with local communities

As collection from the project ITERAMS in cluster with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials

Authors: Jordi Guimerà, Mika Paajanen November 2017

Project name, grant, website: ITERAMS, grant agreement number 730480, www.iterams.eu/

Point of contact for Communication: Jordi Guimerà, jordi.guimera@amphos21.com, leads WP Exploitation, Dissemination and Communication

Communication with local communities in the frame of ITERAMS:

The ITERAMS projects pursues the goals which are closely linked to the living standards of local communities near mining sites:

1. Conservation and management of freshwater resources.
2. Land occupation and natural resources protection.
3. Minimization of Acid Mine Drainage, waste rock dumps and mine tsailings.

In general terms, Iterams goals refer to a major extent, to enhance the social license concept to operate. A mine property can be taken into production successfully, if the legal and environmental requirements are met and that local communities do not perceive it as a risk to their livelihood, but as source of work, income, and prosperity. To obtain both the formal permits and especially the "social license" the main issues to be mitigated are the use of water, depositing tailings and waste rock, abating dust and noise. In addition, after the mine becomes depleted, an environmentally sound rehabilitation is required; especially strict control of Acid Mine Drainage.

The ITERAMS action has the target to mitigate the environmental impacts of processing, as it is the most important barrier for taking new ore-bodies into production. The ITERAMS proposal addresses the main exploitation barriers by working on several of the action points published in the Strategic Implementation Plan for the European Innovation Partnership on Raw Materials (SIP 2013)

Aspects of communication with local communities considered for discussion

ITERAMS covers social, environmental, and economic issues. As far as communication, the gap of knowledge between the developments of the project and the acceptance of the communities should be minimized. To do so, the following aspects to be considered are proposed:

- Detailed polls in the contexts of the community and the mine
- Average education of the inhabitants; ability to understand the benefits of the goals of the project

- Perception of the inhabitants; what do they expect from a project like Iterams?
- Risk Assessment of the objectives of the project not being accepted or properly perceived
- Building capacity in the community (analysis of the needs, differences in local realities, scope of thematic courses)
- Local Actions: Round Tables , workshops, etc.

Aspects of communication with local communities considered for sharing interest across the different projects

Are there aspects to be shared?

How can projects mutually benefit from one each other?

4.3 ITERAMS TEMPLATE FOR THE CLUSTER WORKING GROUPS

Clustering Document: Sustainability Concepts in Mining

As collection from the project ## in cluster with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials

Template authors: Andreas Ciroth, Mika Paajanen November 2017

Project name, grant, website: ##

Point of contact for sustainability: ##

Goals and idea of the project related to sustainability: why a sustainability assessment:

##

Aspects of sustainability foreseen to be covered, is a life cycle approach[1] followed?

##

How are risk and chance dealt with in the assessment[2]

##

Overall structure of sustainability assessment in the project

##

[1] Sustainability impacts often occur not on site, but, for example for consumables used in the mine, for electricity, or for waste produced, impacts may occur in production or in waste treatment. Life cycle approaches (e.g., http://ec.europa.eu/environment/ipp/lca.htm) are typically used to include the impacts from product production, operation, and end of life and waste treatment.

[2] At times, impacts are not fully known for products, for example for nanobased products, and/or impacts maybe be related to accidents which occur with a certain chance.