Santiago, 25& 26 April, 2016

INTMET PROJECT OVERVIEW

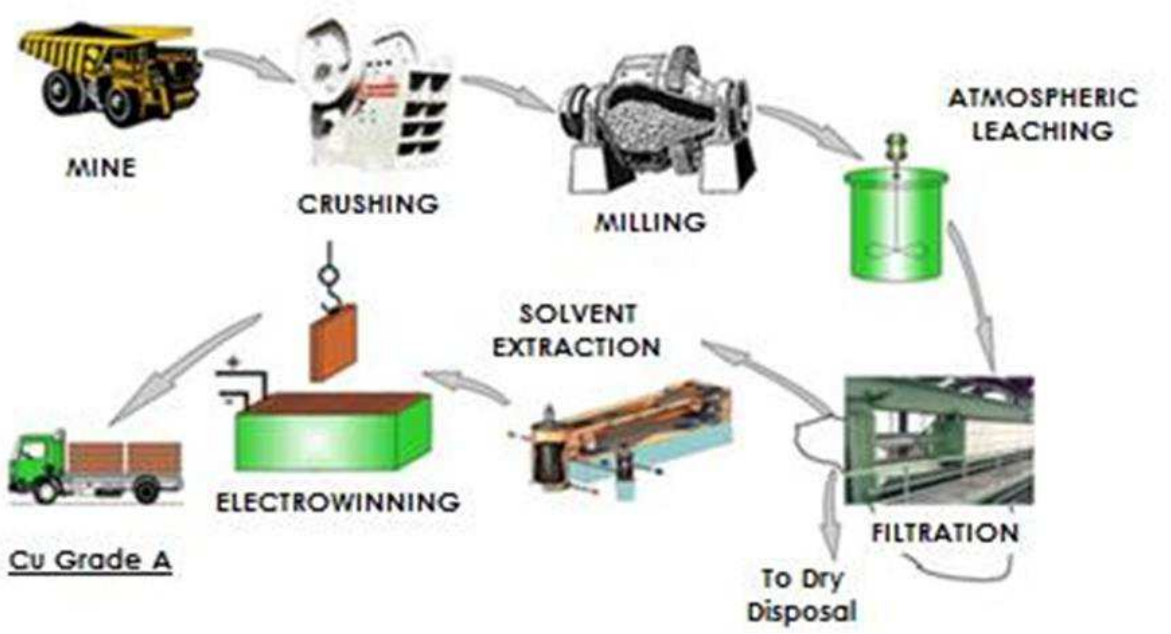
"Integrated innovative metallurgical system to benefit efficiently polymetallic, complex and low grade ores and concentrates"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No: 689515

ANTECEDENTS

COBRE LAS CRUCES, CLC

SECONDARY COPPER ORE HYDROPROCESSING:



COBRE LAS CRUCES

- Sevilla, Spain. Modern and Sustainable mining business.
- Integrated Mine and Hydrometallurgical Plant.
- Atmospheric Leaching + SX + EW.
- Production: 72000 t/a Cu Cathodes.

ANTECEDENTS

EUROPEAN INNOVATION PARTNERSHIP ON RAW MATERIALS

Call for Commitment
07 February, 2014

PolymetOre
POLYMETALLIC ◦ ORES ◦ PROCESSING

Sustainable and efficient beneficiation of polymetallic, complex and low grade ores mined in difficult, small or deep mineral deposits including tailings and wastes

PolymetOre Commitment

Specific Objectives:

- To develop sustainable and efficient technological solutions to benefit polymetallic, complex, and low grade ores.
- To develop required innovative technologies covering the whole value chain from exploration to metals production including reprocessing of tailings and wastes.
- To develop innovative technologies to exploit difficult, small or deep deposits
- To produce added value products including refined metals through the advanced concept "mine to metal".
- To apply for a Pilot Action focused to implement a pilot demonstration facility to process polymetallic and complex ores or concentrates.

ANTECEDENTS

H2020-SC5-
Climate Action,
Environment,
Resource Efficiency
and Raw Materials

This Challenge funds research and innovation with the following specific objectives:

- to achieve a resource – and water – efficient and climate change resilient economy and society,
- the protection and sustainable management of natural resources and ecosystems, and
- a sustainable supply and use of raw materials, in order to meet the needs of a growing global population within the sustainable limits of the planet's natural resources and eco-systems.

THE PARTNERSHIP

No	Name	Short name	Country	Project entry month[8]	Project exit month
1	COBRE LAS CRUCES SA	CLC	Spain	1	36
2	KGHM POLSKA MIEDZ SA	KGHM	Poland	1	36
3	SOMINCOR - SOCIEDADE MINEIRA DE NEVES-CORVO SA	SOMINCOR	Portugal	1	36
4	OUTOTEC (FINLAND) OY	OUTOTEC	Finland	1	36
5	TECNICAS REUNIDAS SA	TR	Spain	1	36
6	INSTYTUT METALI NIEZELAZNYCH	IMN	Poland	1	36
7	MINTEK	MINTEK	South Africa	1	36
8	MINING AND METALLURGY INSTITUTE BOR LTD	BOR INST	Serbia	1	36
9	BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES	BRGM	France	1	36
10	AGQ MINING & BIOENERGY SL	AGQ	Spain	1	36
11	Institutul National de Cercetare - Dezvoltare Pentru metale Neferoase si Rare - IMNR	IMNR	Romania	1	36
12	GUENTER TIESS	MINPOL	Austria	1	36

THE CHALLENGES

- IntMet project intends to develop an innovative Technology Breakthrough to deal efficiently with polymetallic and complex ores, including:
  - Low grade, complex mineralogy ores
  - Ores containing carbonaceous materials
  - Polymetallics: Cu, Zn, Pb, Ag, Au, In, As, Sb…
  - Difficult flotation, poor recovery ores
- To now, there is not any Industrial Plant in the world dealing with low-grade, polymetallic or bulk concentrates, therefore we are conscious that IntMet is a difficult project but very challenging: to develop new hydrometallurgical solutions having potential application all over the world.
- IntMet project has to be focused to solve specific problems of the mining partners: CLC, Somincor, KGHM, Bor, and at the same time, providing solutions to be globally applied to mining-metallurgical sector.
- To settle properly the project basis, the partners:
  - Define the objectives and expectations
  - Identify and provide raw materials for testing
  - Analyse and control any risk or limitation

THE OBJECTIVES

- Integrated sustainable metallurgical system:
  - hydro-
  - bio-
  - electrometallurgical-
- Maximising metal recovery yield
- Optimising energy consumption
- Minimising environmental footprint

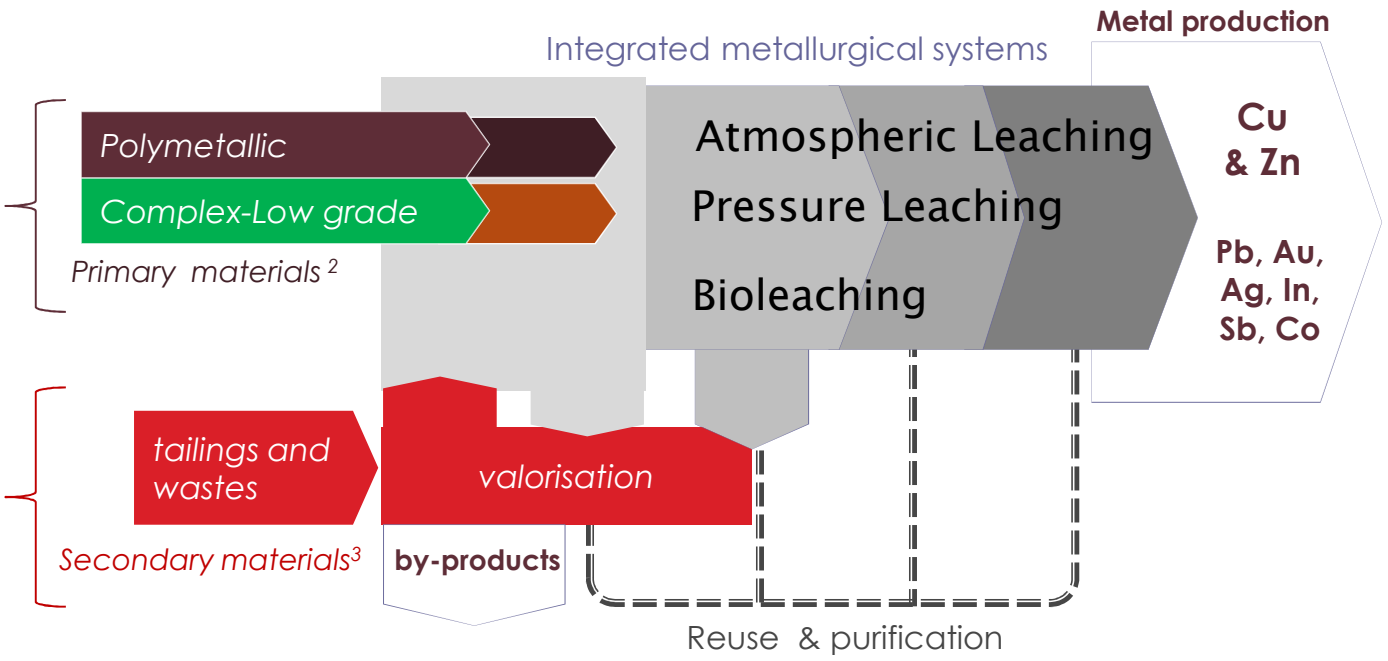
- Ensuring the economic viability of the entire process
- Upstream (pre-processing) and down-stream (treatment/use of metallurgical wastes such as tailings, effluents) interfaces should also be considered.

EXPECTED IMPACTS

- Pushing the EU to the forefront in the areas of sustainable exploration, mining and processing technologies and solutions.
- Improved competitiveness and creation of added value and new jobs in materials producing and downstream industries.
- Unlocking a substantial volume of difficult raw materials within the EU.
- Enabling the better efficiency of exploitation of raw materials' resources and increasing the range and yields of recovered raw materials.
- Improved economic viability and investment security of mining operations.
- Increase process efficiency (including water and energy optimisation) and reduced environmental footprint.
- Contribution to achieve the objectives of the EIP on Raw Materials, in particular, paying attention to Pilot Actions.

TECHNOLOGY APPROACH

MINING INDUSTRY[1] | RESEARCH CENTERS TECHNOLOGY PROVIDERS | DOWNSTREAM STAKEHOLDERS



ADVISORY BOARD
- Research
- Metal industry
- Auxiliary industry
- Goverments
- Environmental NGOs

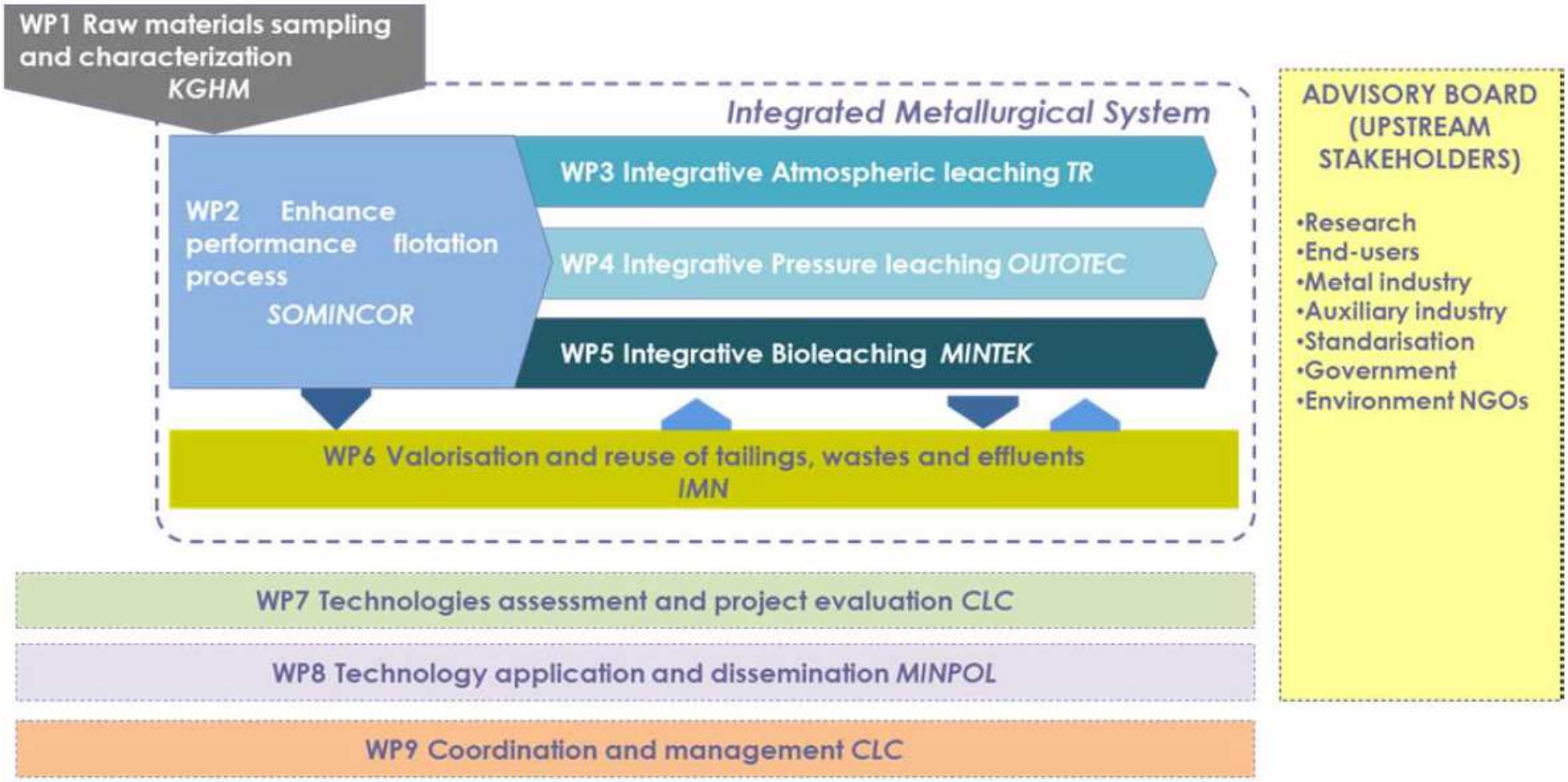
LCA

TECHNOLOGY LEADERS:

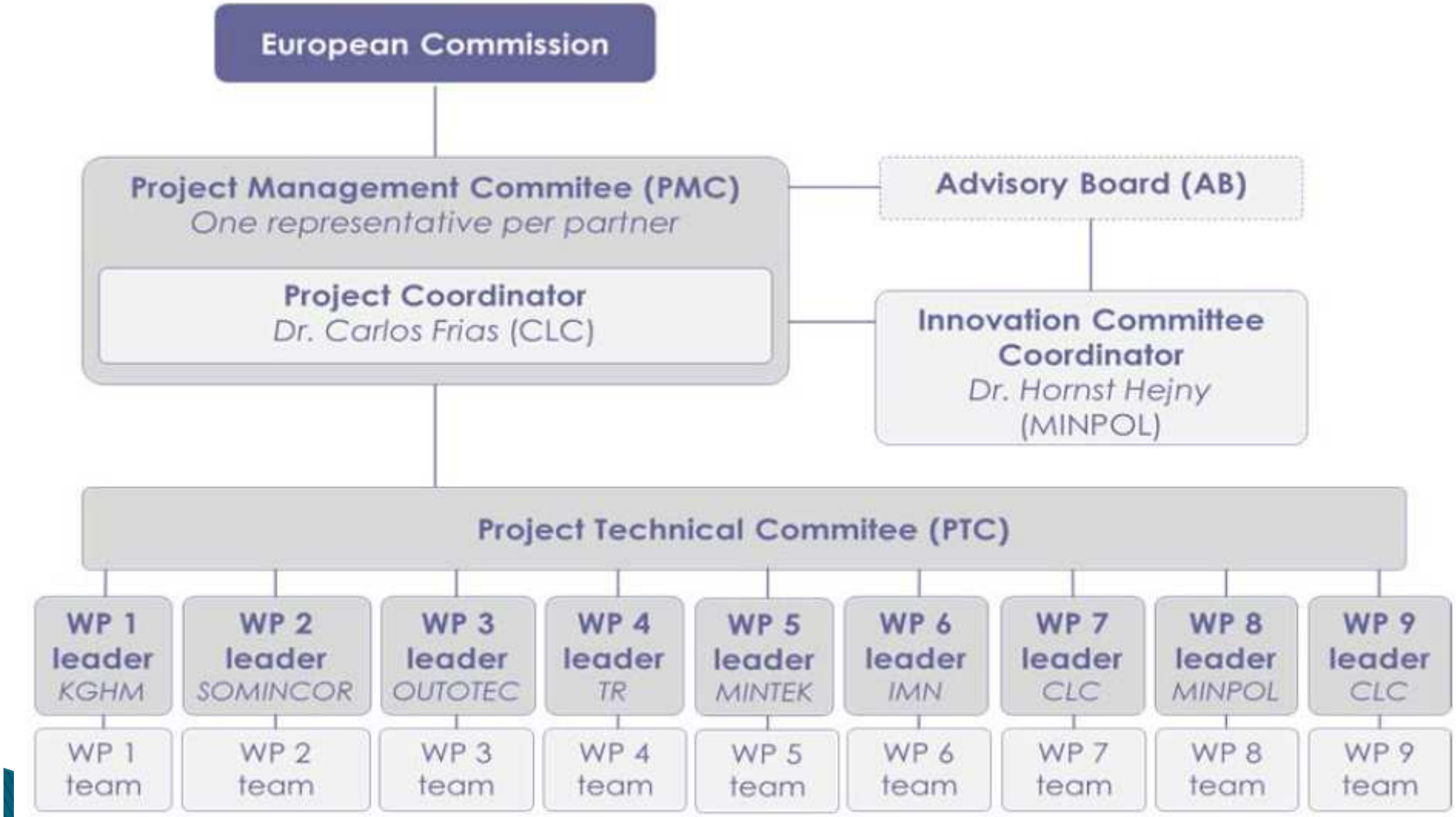
- ATMOSPHERIC LEACHING: CLC
- PRESSURE LEACHING: OUTOTEC
- BIOLEACHING: MINTEK

GA No: 689515

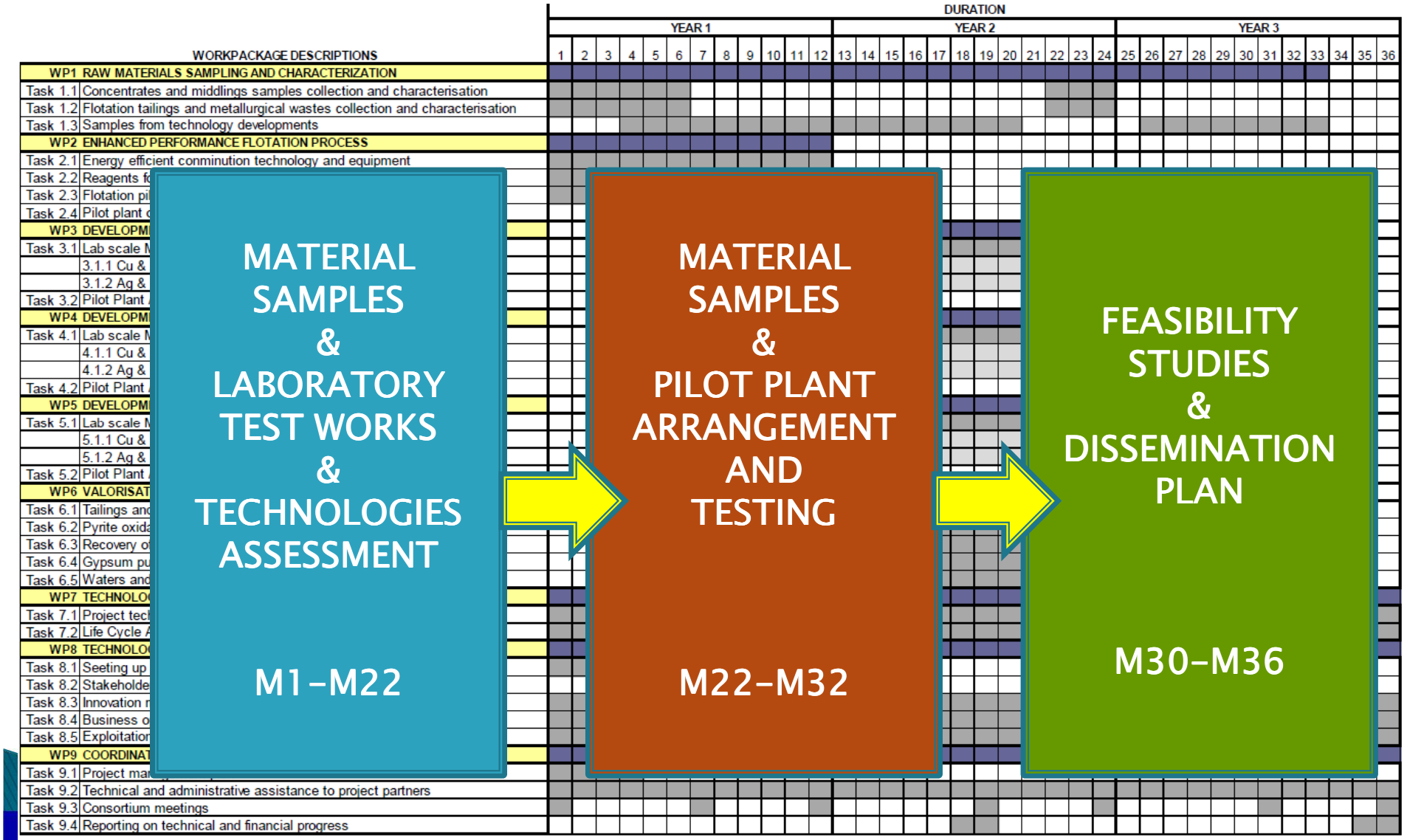
PROJECT STRUCTURE



MANAGEMENT


European Commission
Project Management Commitee (PMC)
One representative per partner
Project Coordinator
Dr. Carlos Frias (CLC)
Advisory Board (AB)
Innovation Committee Coordinator
Dr. Hornst Hejny
(MINPOL)
Project Technical Commitee (PTC)
WP 1 leader KGHM
WP 2 leader SOMINCOR
WP 3 leader OUTOTEC
WP 4 leader TR
WP 5 leader MINTEK
WP 6 leader IMN
WP 7 leader CLC
WP 8 leader MINPOL
WP 9 leader CLC
WP 1 team
WP 2 team
WP 3 team
WP 4 team
WP 5 team
WP 6 team
WP 7 team
WP 8 team
WP 9 team

SCHEDULE


DURATION
YEAR 1
YEAR 2
YEAR 3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
WORKPACKAGE DESCRIPTIONS
WP1 RAW MATERIALS SAMPLING AND CHARACTERIZATION
Task 1.1 Concentrates and middlings samples collection and characterisation
Task 1.2 Flotation tailings and metallurgical wastes collection and characterisation
Task 1.3 Samples from technology developments
WP2 ENHANCED PERFORMANCE FLOTATION PROCESS
Task 2.1 Energy efficient comminution technology and equipment
Task 2.2 Reagents f
Task 2.3 Flotation pi
Task 2.4 Pilot plant
WP3 DEVELOPM
Task 3.1 Lab scale M
3.1.1 Cu &
3.1.2 Ag &
Task 3.2 Pilot Plant
WP4 DEVELOPM
Task 4.1 Lab scale M
4.1.1 Cu &
4.1.2 Ag &
Task 4.2 Pilot Plant
WP5 DEVELOPM
Task 5.1 Lab scale M
5.1.1 Cu &
5.1.2 Ag &
Task 5.2 Pilot Plant
WP6 VALORISAT
Task 6.1 Tailings and
Task 6.2 Pyrite oxida
Task 6.3 Recovery of
Task 6.4 Gypsum pu
Task 6.5 Waters and
WP7 TECHNOLO
Task 7.1 Project tech
Task 7.2 Life Cycle A
WP8 TECHNOLO
Task 8.1 Seeting up
Task 8.2 Stakeholde
Task 8.3 Innovation r
Task 8.4 Business o
Task 8.5 Exploitation
WP9 COORDINAT
Task 9.1 Project ma
Task 9.2 Technical and administrative assistance to project partners
Task 9.3 Consortium meetings
Task 9.4 Reporting on technical and financial progress
MATERIAL SAMPLES & LABORATORY TEST WORKS & TECHNOLOGIES ASSESSMENT
M1-M22
MATERIAL SAMPLES & PILOT PLANT ARRANGEMENT AND TESTING
M22-M32
FEASIBILITY STUDIES & DISSEMINATION PLAN
M30-M36

FINAL REMARKS

- The INTMET project represents a challenging opportunity to develop suitable technological solutions to deal efficiently with difficult, polymetallic and complex ores that are abundant in some mining regions in Europe: Spain, Portugal, Poland, Serbia, etc, and also in many other deposits worldwide.

- A strong consortium has been created to develop the INTMET project including well-qualified mining companies, skilled technologists, research centres, and others. We believe that we are in the best position to achieve successful development of the new integrated bio- and hydro- metallurgical technologies to be eventually applied all over the world dealing with low-grade, polymetallic and bulk concentrates.

FUTURE PILOT ACTION

PILOT ACTIONS. RAW MATERIALS

SC5-13-2016-2017: New solutions for sustainable production of raw materials

b) Processing of lower grade and/or complex primary and/or secondary raw materials in the most sustainable ways (2017): Proposals should demonstrate new systems integrating relevant processing and refining technologies for better recovery of minerals and metals from low grade and/or complex ores, industrial or mining wastes at increased efficiency in terms of better yield and process selectivity. The importance of the targeted raw materials and their sources for the EU has to be demonstrated in the proposal. The solution proposed should be flexible enough to adapt to different ore grades and should be supported by efficient and robust process control.

c) Sustainable metallurgical processes (2017): Proposals should develop innovative metallurgical systems integrating pyro-, hydro-, bio-, and/or electro-metallurgical and/or electrochemical technologies, in order to enhance the production efficiency, metal recovery and selectivity from primary and/or secondary raw materials.

THANK YOU ii

GRACIAS ii

GA No: 689515