



# Opportunities and risks for mining business in the Iberian Pyrite Belt, Spanish territory.

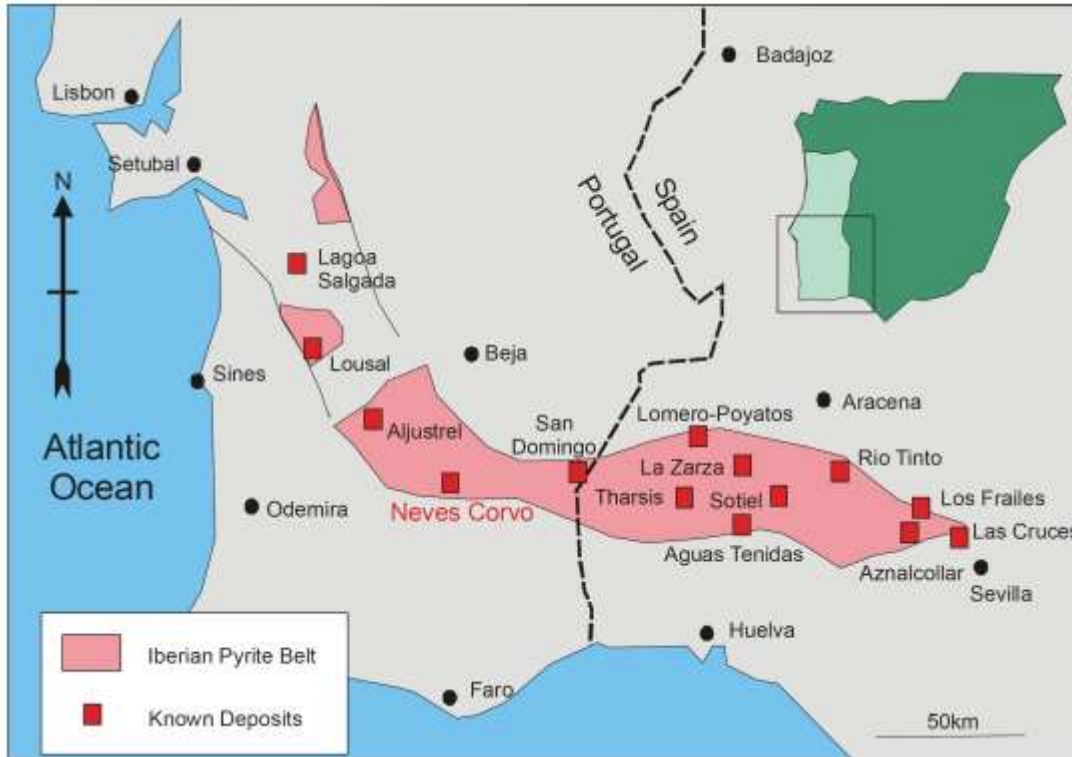
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# Una plataforma para el desarrollo de la Minería Metálica en Andalucía

# THE IBERIAN PYRITE BELT (IPB)

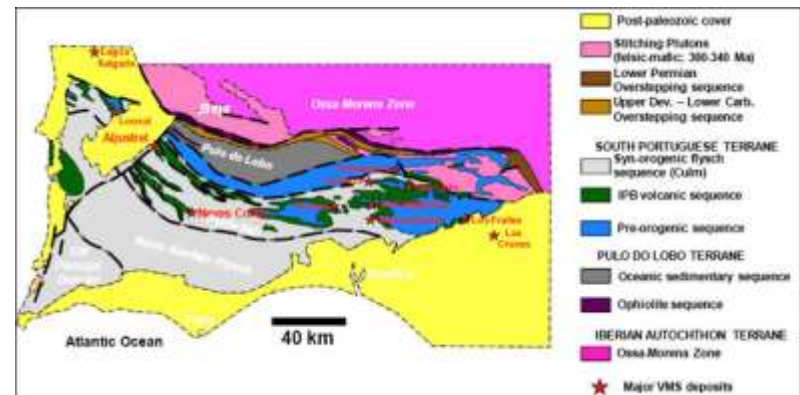
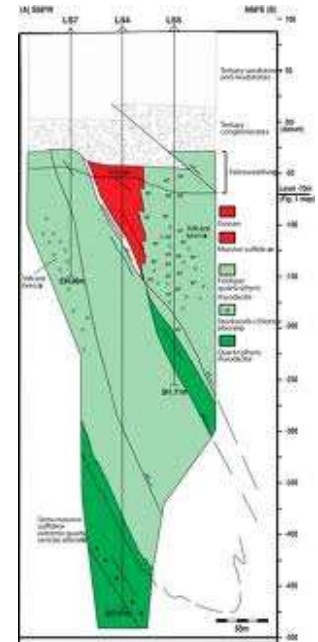


- Covers a territory of 240 km by 35 km in Spain and Portugal
- Estimated current resources are over 1,500 million tonnes of primary massive sulphides
- Mined more than 5,000 years, having over 200 mines open along the times

- The industrial-scale mining exploitation started at the end of XIX century mainly focused on copper extraction and pyrite for sulphuric acid production
- The modern mining projects were developed along the 70's and 80's of the XX century and aimed to produce copper, zinc, and lead concentrates through selective flotation

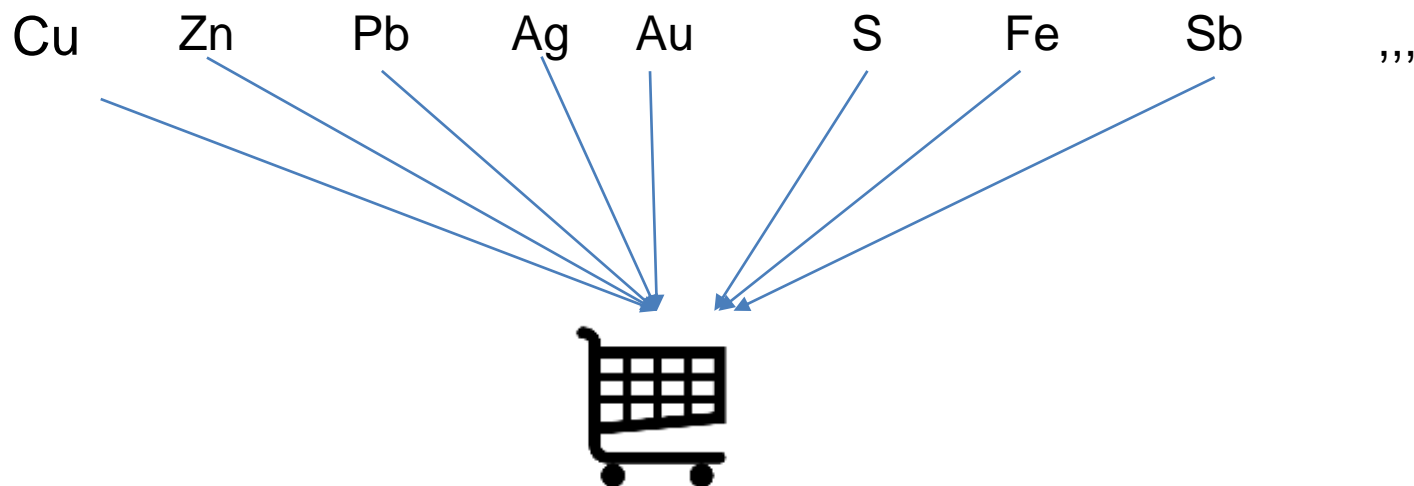
## OPERATION MINES

- ❖ **MATSA: AGUAS TEÑIDAS, SOTIEL AND LA MAGDALENA.**
  - ❖ High grade polymetallic sulphides
  - ❖ Underground mining.
  - ❖ Copper and polymetallic concentrates.
  
- ❖ **CLC – FQM.**
  - ❖ High grade copper secondary sulphides.
  - ❖ Open pit.
  - ❖ Copper cathodes.
  
- ❖ **ATALAYA MINING - RIOTINTO PROJECT**
  - ❖ Copper sulphides – stockwork
  - ❖ Open pit
  - ❖ Copper concentrates.

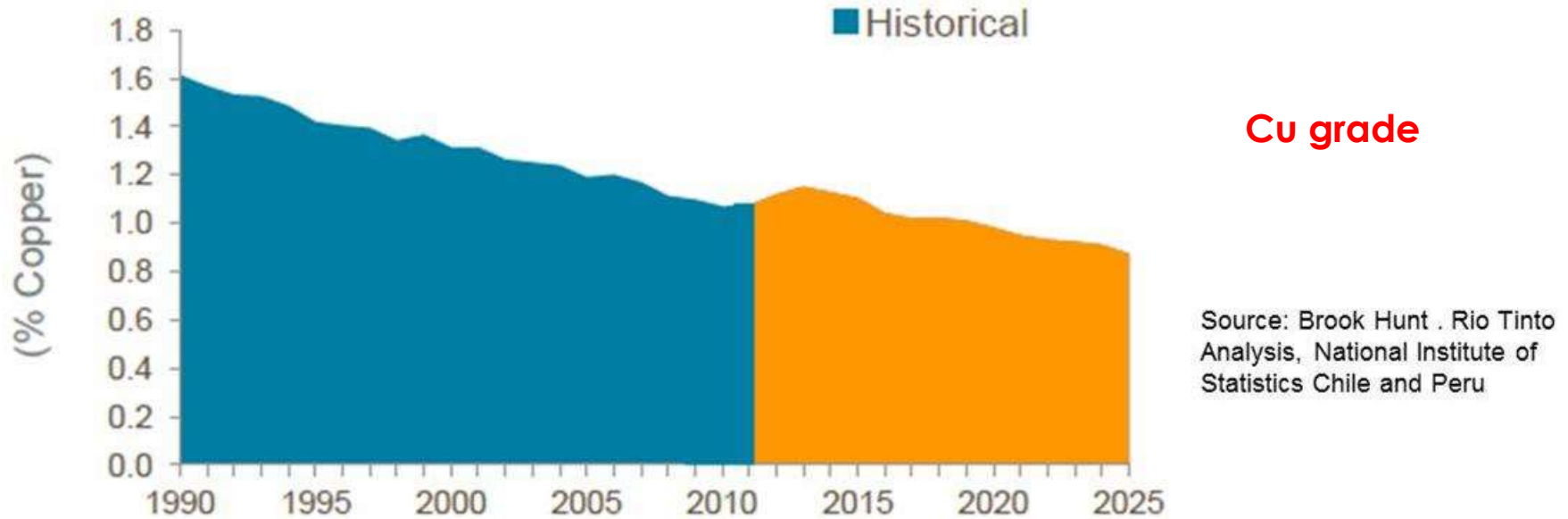


## Opportunities: POTENTIAL GEOLOGICAL RESOURCES

- The different associations between major minerals give rise to the three main types of mineralization: pyrite, copper (cobrizos) and polymetallic
- They are essentially comprised of pyrite and, to a lesser extent, by sphalerite and galena, chalcopyrite, tetrahedrite. Frequent minor minerals include arsenopyrite, pyrrhotite, cassiterite, stannite, barite, magnetite, electrum and cobaltite. And small occurrences of gold and silver free or associated with others minerals.



## Opportunities : High potential to discover new deposits



- ❖ **PORTUGAL:** NEVES CORVO (3-10% Cu); SEMBLANA (>3% Cu)  
ALJUSTREL (>2.5% Cu Eq.)
- ❖ **SPAIN:** COBRE LAS CRUCES (>5% Cu); AGUAS TEÑIDAS (>3% Cu Eq.)  
LA MAGDALENA (>3% Cu Eq.); LOS FRAILES (>2.5% Cu Eq.)

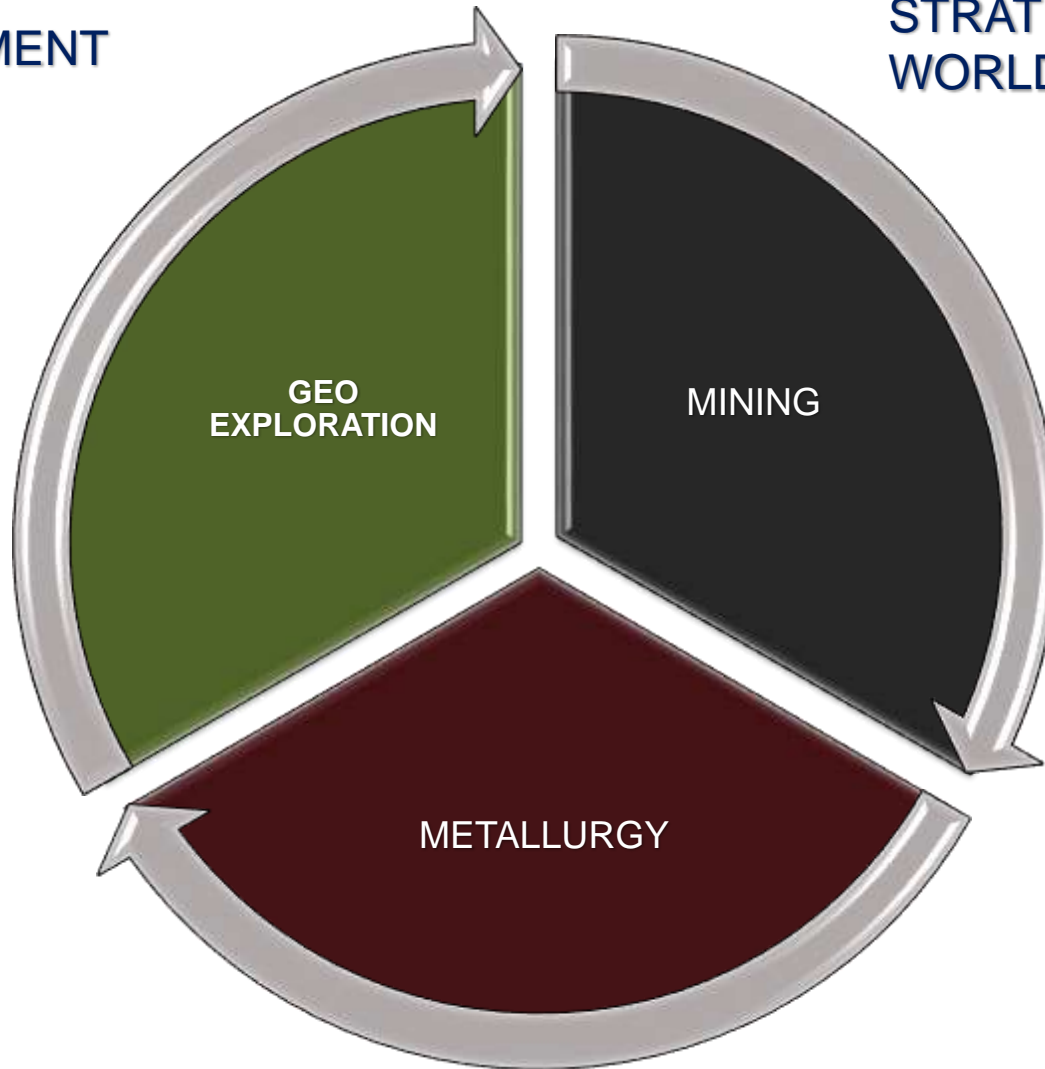
The IPB presents high-potential to discover new deposits; particularly of interest is the high-grade of exploited mines in comparison to worldwide average.



# MINING BUSSINESS GOALS

MAJOR INVESTMENT  
Public support ?

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BEST EXPERTISE AND  
STRATEGIES AVAILABLE  
WORLDWIDE

application

RESEARCH AND DEVELOPMENT NEW TECNOLOGIES  
Need to concentrate efforts

## MAIN FOCUS OF ACTION

**Polymetallic Sulphides Beneficiation found Technical Limitations to achieve high metals recovery.**

**Some attempts in the past and nowadays for developing new metallurgical processes.**



**RESEARCH AND DEVELOPMENT  
(demo and industrial scale)**

**Private and Public support  
High level professional formation  
Metallurgical Services Auxiliary Companies**



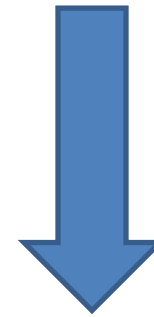
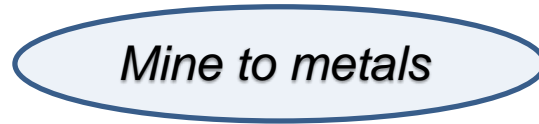
## Metallurgy challenges (I)

**Polymetallic sulphides**

Cu  
Zn  
Pb  
Ag



**BULK CONCENTRATES**  
Maximum metals recovery



**HYDROMETALLURGICAL PROCESSES**  
Metals recovery

Processes

PRESSURE OXIDATION

BIO-OXIDATION

ATMOSPHERIC ACIDIC FERRIC SULPHATE LEACHING

CLORIDE LEACHING



## Metallurgy challenges (II)

Pyrite



ROASTING



$H_2SO_4$

ACID LEACHING



Cu , Zn

CYANIDATION



Au , Ag

CONDITIONING



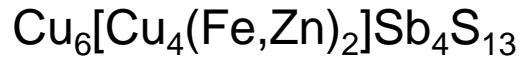
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**INTEGRAL VISION PROCESS**

**Possible ¿?**

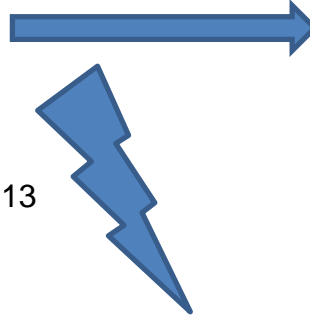
## Metallurgy challenges (III)

### Tetrahedrite



Cu – 34,8 %

Sb – 29,64%



Impurity – penalty in concentrates

The Raw Materials Strategy of the European Union

Materias primas	Principales productores mundiales (media 2010-2014)	Principales importadores a la UE (media 2010-2014)	Fuentes de suministro de la UE (media 2010-2014)	Índice de dependencia de las importaciones *	Índices de sustitución IE/RS**	Índice de aporte del reciclado al final de su vida útil***
Antimonio	China (87 %) Vietnam (11 %)	China (90 %) Vietnam (4 %)	China (90 %) Vietnam (4 %)	100 %	0,91 / 0,93	28 %

**DIFERENTIAL VISION PROCESS**  
Possible ¿?



## Future risks and challenges to encourage the development of the mining business

Risk of wasting the current moment with projects in operation and start-up to make a new investment effect tractor

Need for change in the regulatory framework.

- Simplification.
- Integrated administrative processes.

Promoting investment.

- Clear rules.
- Taxes benefits.
- Basic and preliminary studies and evaluation supported by government.  
Developing prospects.

Tangible return for local societies.



# Mining helping the growth of Andalusia

Thank you / Obrigado / Gracias