

Mineral resources and land use planning

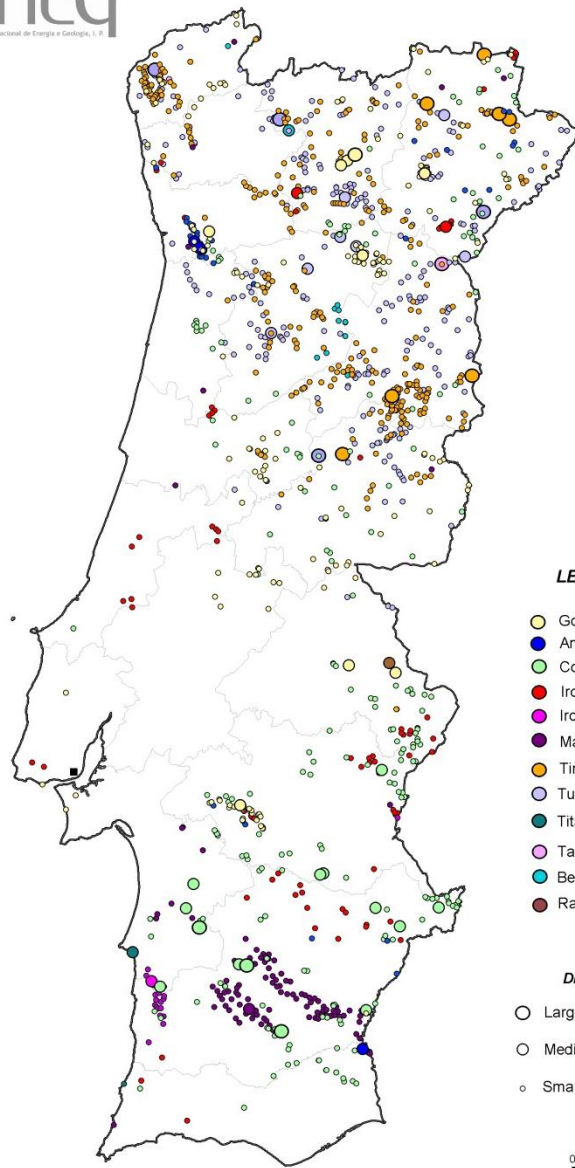
II EU – Latin America Dialogue on Raw Materials

Cartagena de Indias, Colombia, 22-23 September 2015

Mineral resources and land use planning

- Motivation

- Ensuring access to mineral resources is one of the keys to the forthcoming success of the mining industry worldwide and should be *pondered equally* with other land uses.
- All the activities related to the mining sector (from exploration to rehabilitation after exploitation) must be considered in policies/practices of land planning/management.
- The fundamental critical factors determining the non-linear dynamic behaviour of mining industry should be considered, as well as specific scale-dependent features.



European ranking:

- Copper – 3rd
- Tungsten – 2nd
- Lithium – 1st
- Ornamental stones – 4th

Other Critical Raw-Materials:

- Sb, In, Nb, Ta, Be, Ge

Other relevant resources and reserves:

- Fe, Zn, U, Sn, Au, Ag, Mn
- kaolin, special clays
- Quartz, feldspar
- Special sands
- Halite, gypsum
- talc
- Aggregates ...

LEGEND

- Gold
- Antimony
- Copper, Lead and Zinc
- Iron
- Iron and Manganese
- Manganese
- Tin
- Tungsten
- Titanium
- Tantalum
- Beryllium
- Rare Earths

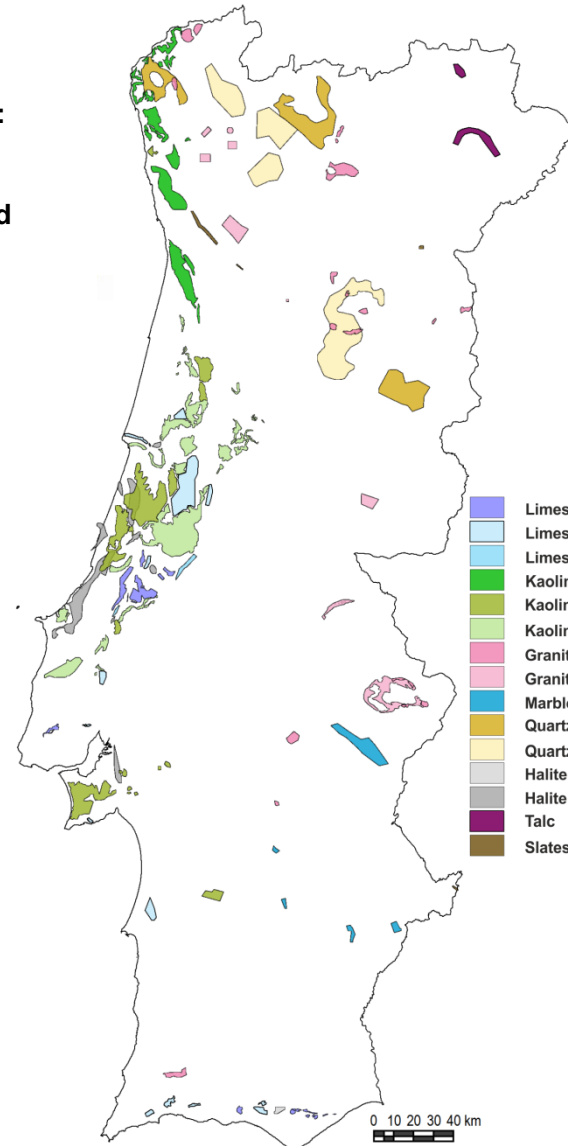
DIMENSION

- Large mineral deposit
- Medium mineral deposit
- Small mineral deposit

SCALE

0 10 20 30 km

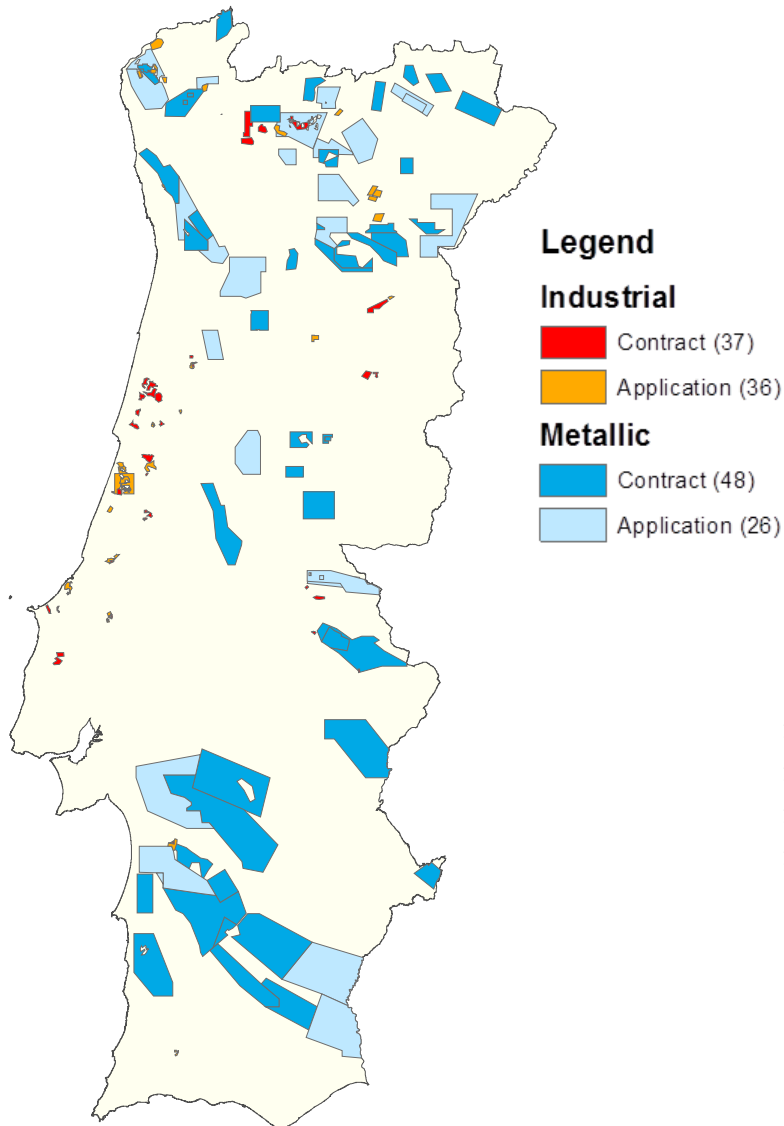
POTENTIAL AREAS FOR NON-METALLIC MINERALS AND ROCKS



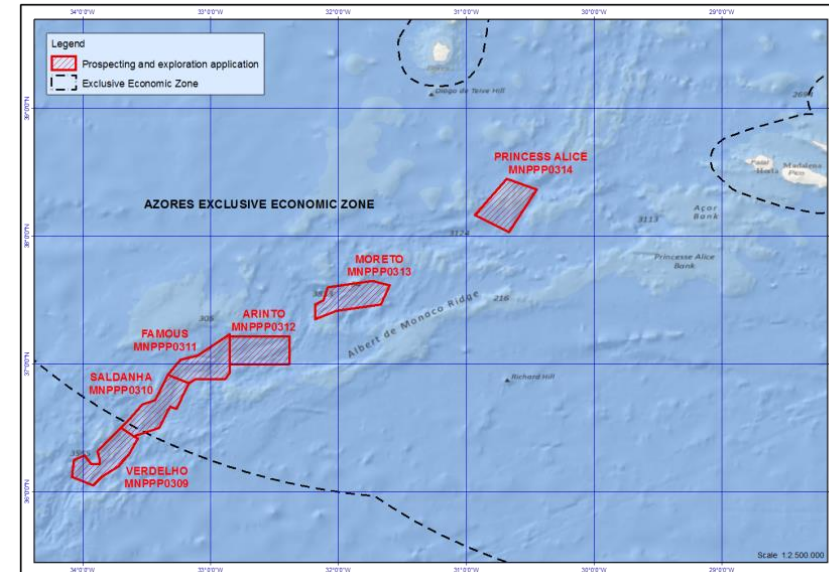
- Limestone (ornamental)
- Limestone (aggregates)
- Limestone and dolostone (aggregates)
- Kaolin
- Kaolin and special sand
- Kaolin, sand and clay
- Granite (ornamental)
- Granite (ornamental and aggregates)
- Marble (ornamental)
- Quartz, feldspar and lithium
- Quartz and feldspar
- Halite
- Halite and gypsum
- Talc
- Slates (ornamental)

0 10 20 30 40 km

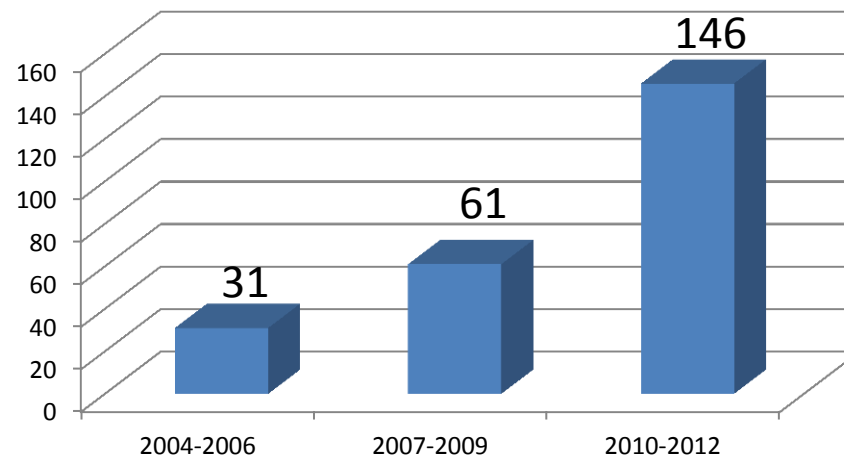
Exploration Contracts and Applications Metallic and Industrial Minerals



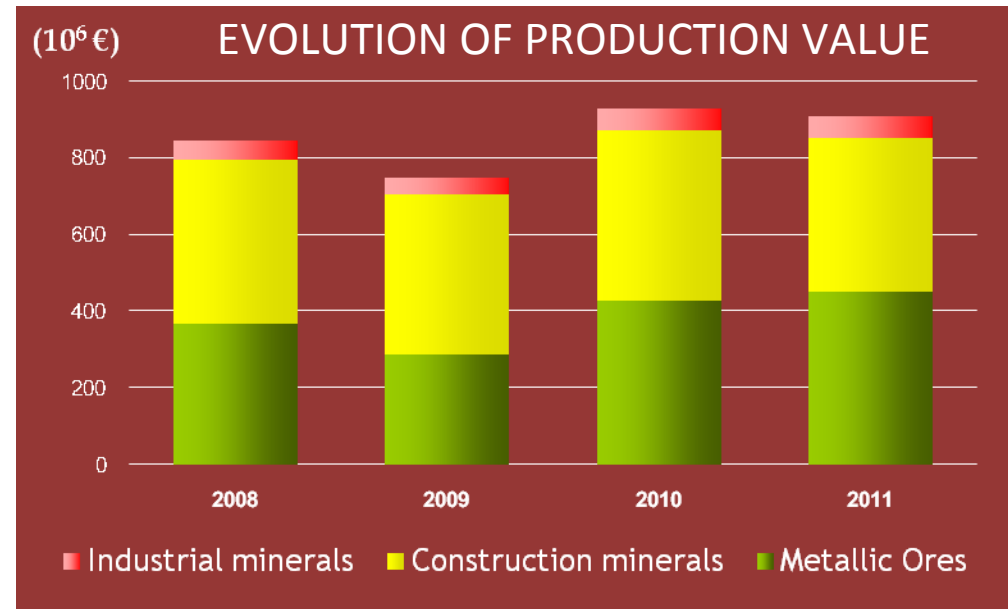
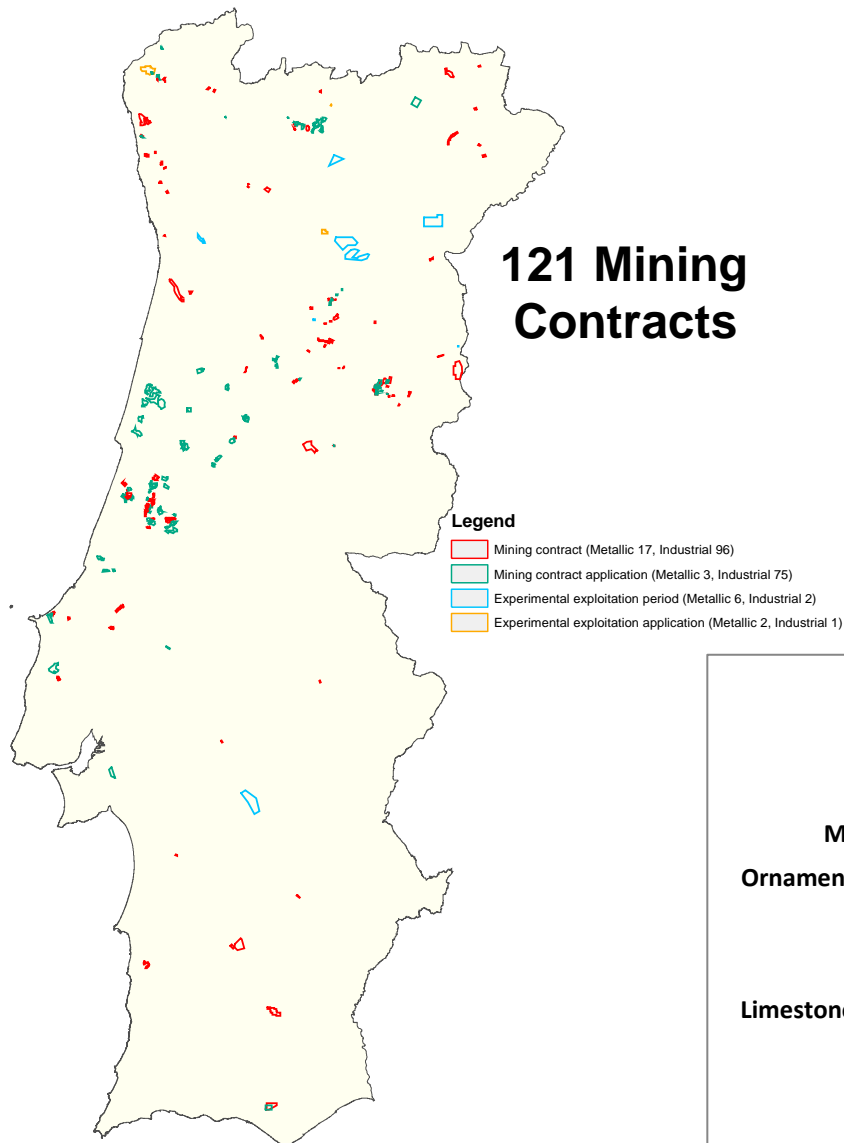
Exploration Applications – Deep sea



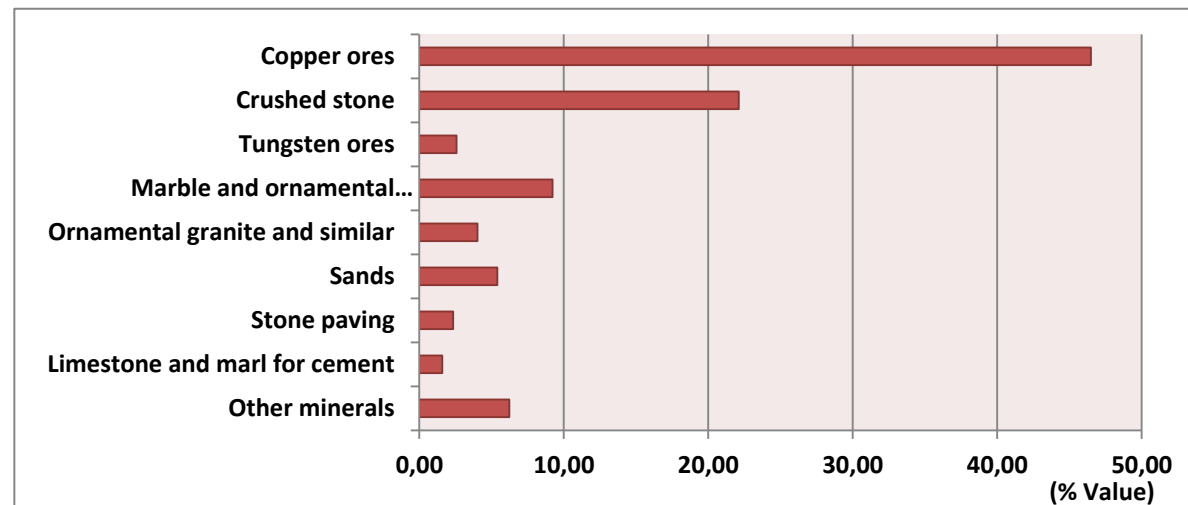
Exploration permits evolution 2004-2012



Mining Contracts and Applications Metallic and Industrial Minerals



Main commodities Produced - 2011



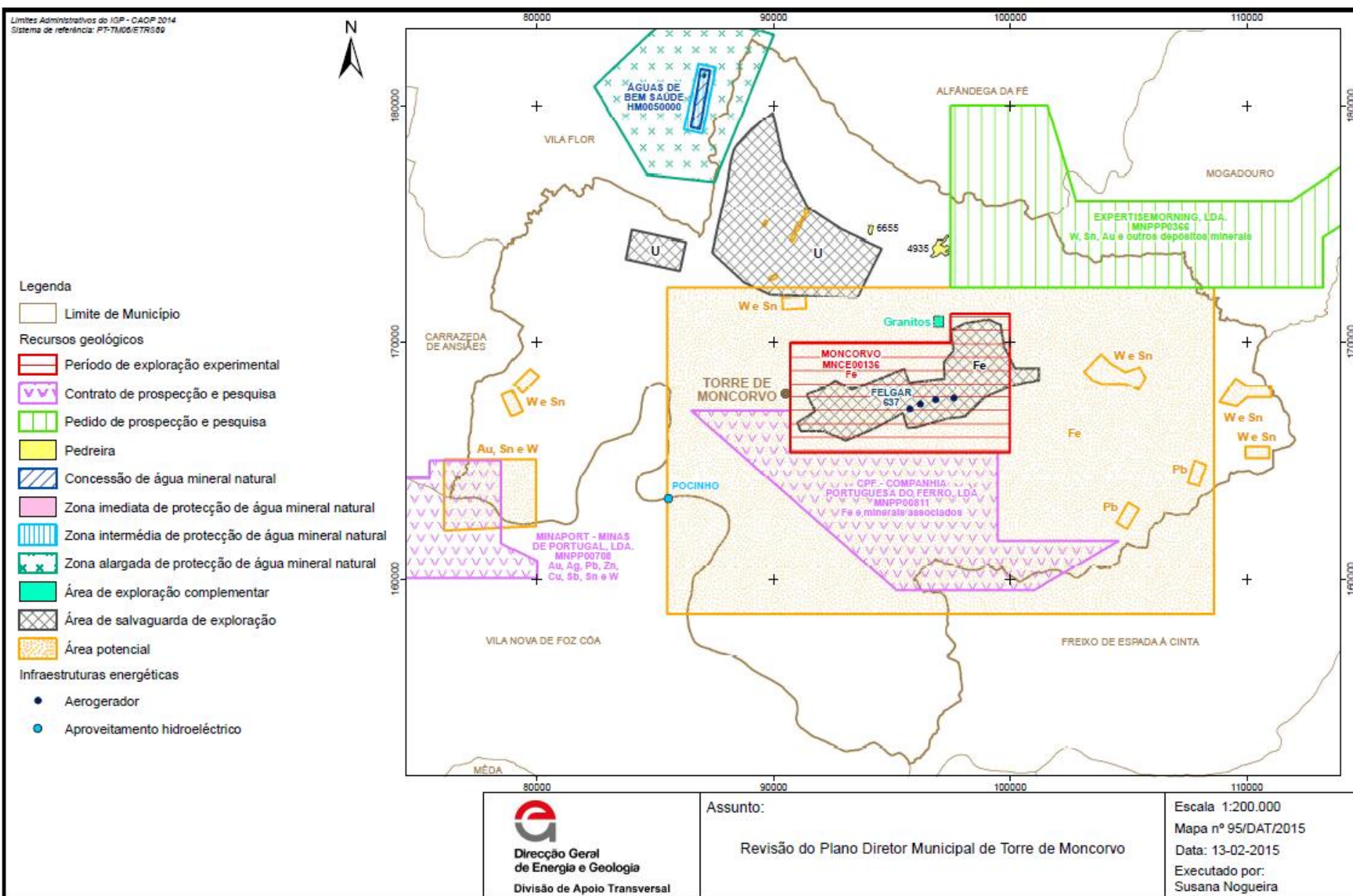
- Legislation reviewed and updated recently
- Current practice of competent authorities:

Assistance to the ongoing revision of Municipal (PDM's) and Regional (PROT's) Land Management Plans, recommending areas to safeguard the access to mineral resources on the basis of a methodology that considers a set of criteria, namely:

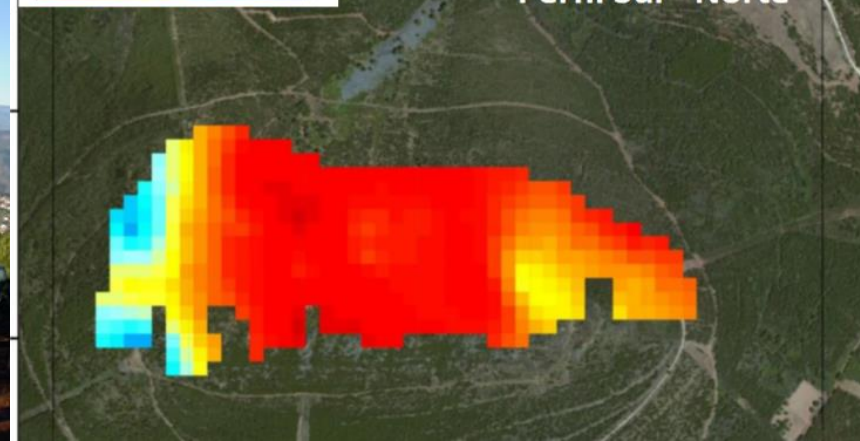
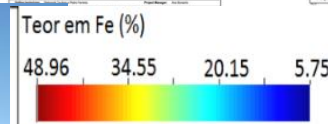
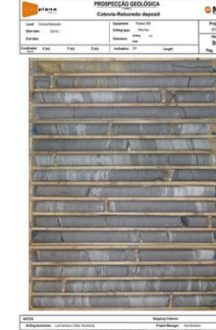
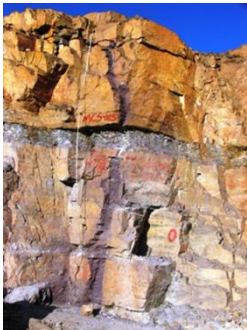
- Level of geological knowledge;
- Level of demonstrated use;
- Level of environmental impact; and
- Level of economic and social impact.

Categorisation key:

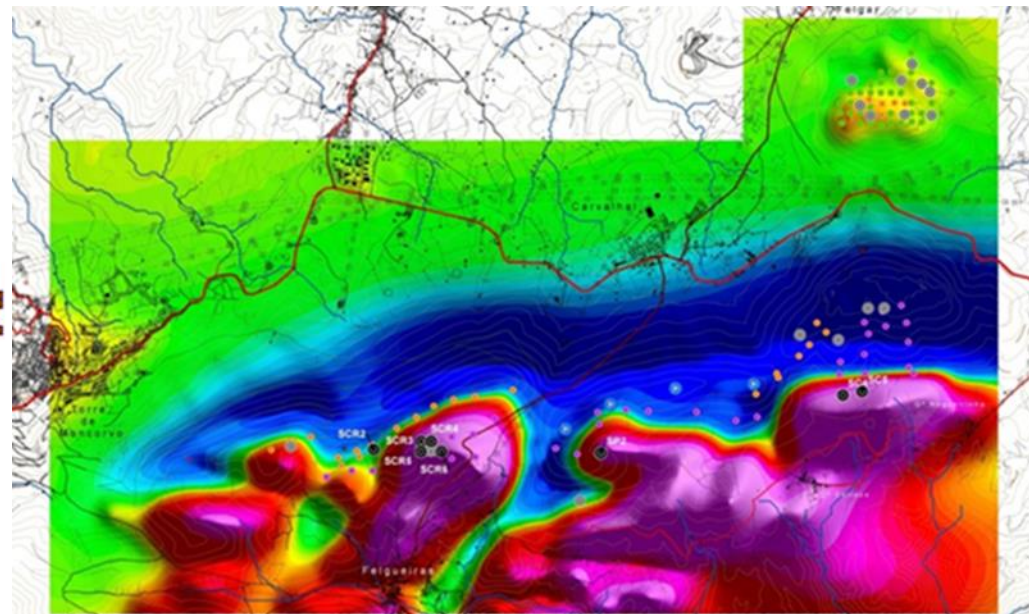
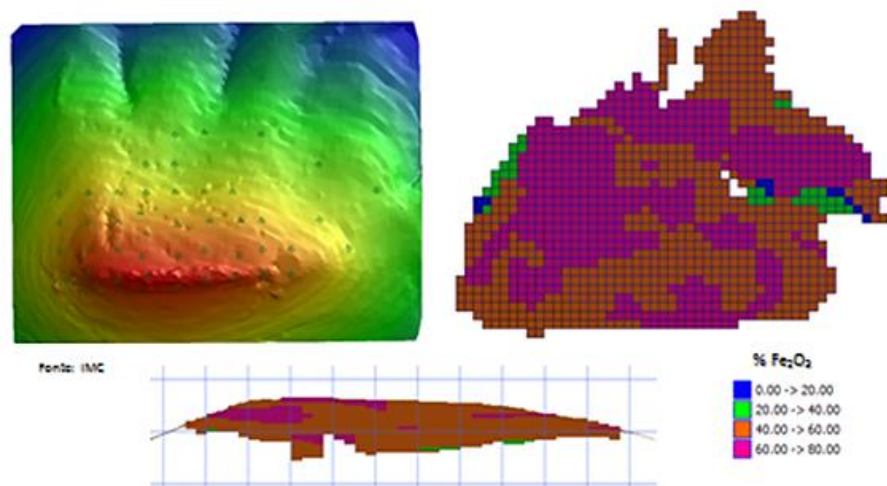
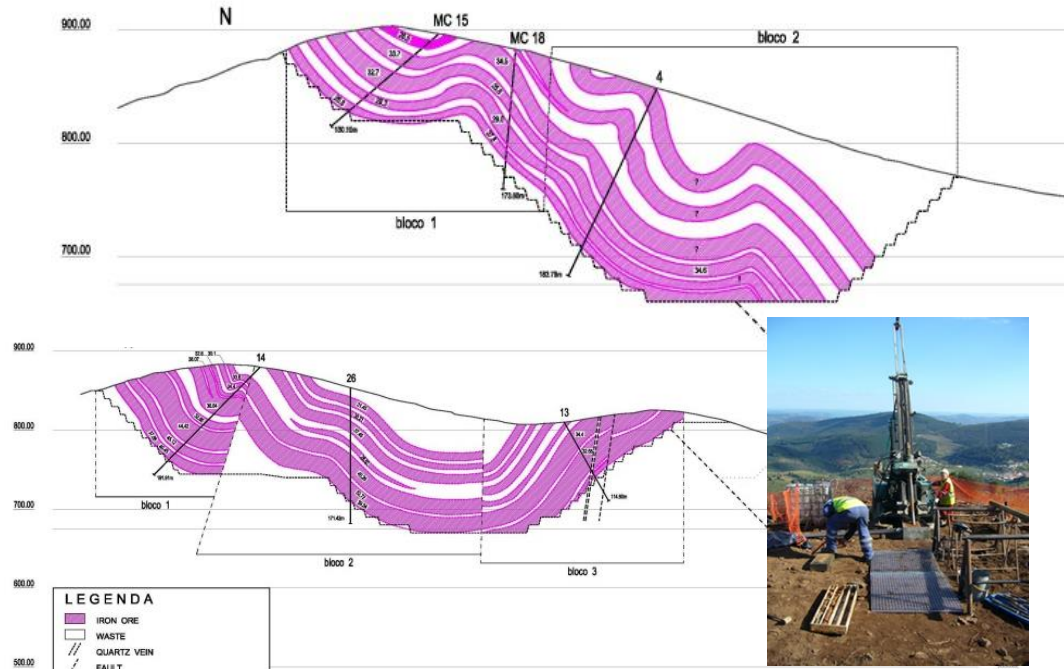
- **Area of Consolidated Activity:** *where a significant exploitation activity already exists and whose further development should be addressed according to environmental good standards, ensuring as well the best use of the geological resource.*
- **Area of Complementary Exploitation:** *contiguous, or not, to an area of consolidated activity, overcoming difficulties posed by the exhaustion of available reserves and/or the evolution of rehabilitation measures.*
- **Area of Exploitation Defence:** *where the resource is identified and can originate a consolidated activity when necessity and/or opportunity criteria are fulfilled.*
- **Potential Area:** *with demonstrated interest and possibly placed in one of the previous categories according to new data and/or results gathered in updated feasibility studies.*
- **Area Under Rehabilitation:** *already exploited and where on-going or planned landscape recovery and/or other remediation actions will allow subsequent release to other uses.*



The exploration works confirmed the existence of **543 million tonnes** of measured and indicated resources, plus 250 million of inferred resources, with an average grade of 47,4 % of iron. Please note that the 2nd iron producing mine in the EU, Erzberg in Austria, has only 235 million de tonnes of resources or that the Ukrainian iron ore has an average grade of 30%.



The Reboredo deposits were drilled, after an aeromagnetic survey, revealing the existence of a magnetic ore layer, with a width of 200m, bellow the known 100 m width hematite layer. This can means the existence of 3 times more the resources already identified.

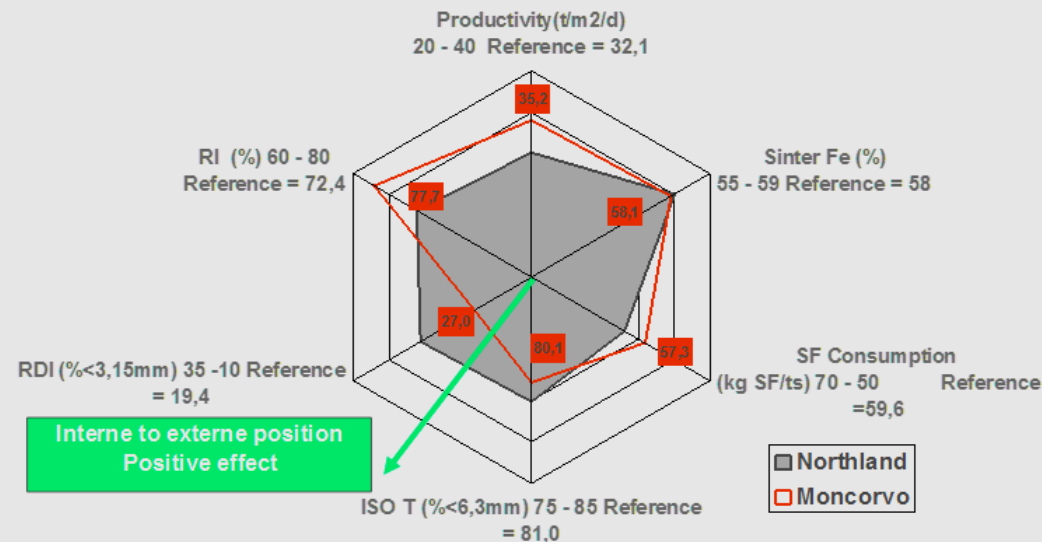


After several beneficiation tests, was proved that is possible to produce iron concentrates according with the market specifications.

(Moncorvo blended 2013 CETEC) **Fe: 67,70% SiO₂: 1,05% P: 0,09% Al₂O₃: 0,53%**

The following tests, comparable for the obtainment of “*sinter feed*”, confirmed the quality of the Moncorvo ore. All the tests were done in reference labs.

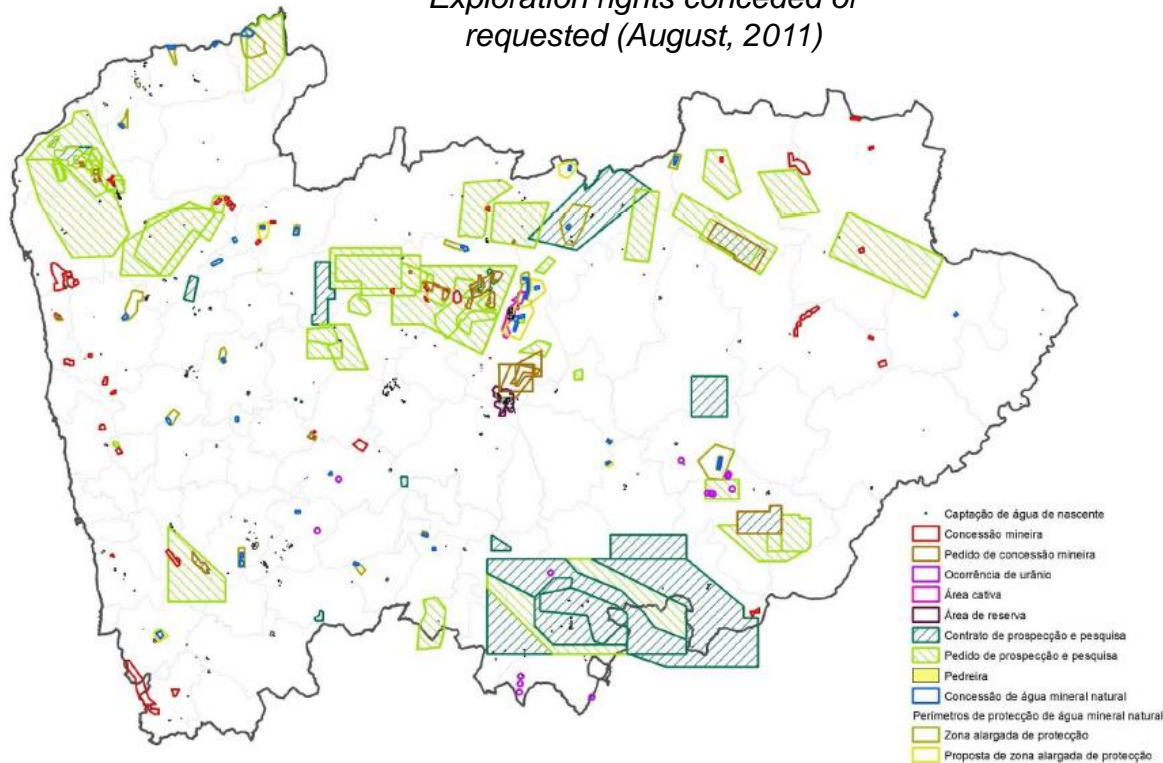
Conclusion Moncorvo compared to the reference



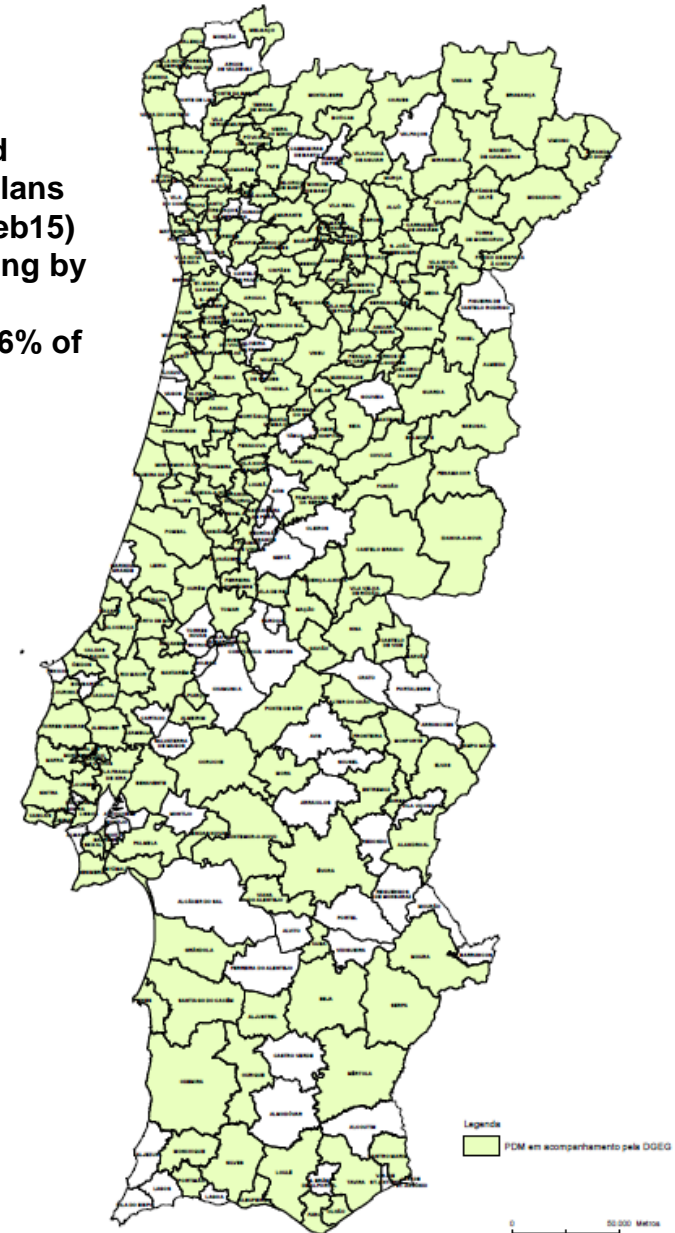
- **Very good productivity despite the very fine size distribution of Moncorvo**
- Good solid fuel consumption
- Correct sinter quality:
 - ISO T at the reference
 - Correct RDI in agreement with sinter Alumina content
 - Chemical analysis showed that it is possible to produce good sinter with Moncorvo ore, despite the high amount of P.

Other examples of useful tools

*Geological Resources, North Region
Exploration rights conceded or
requested (August, 2011)*



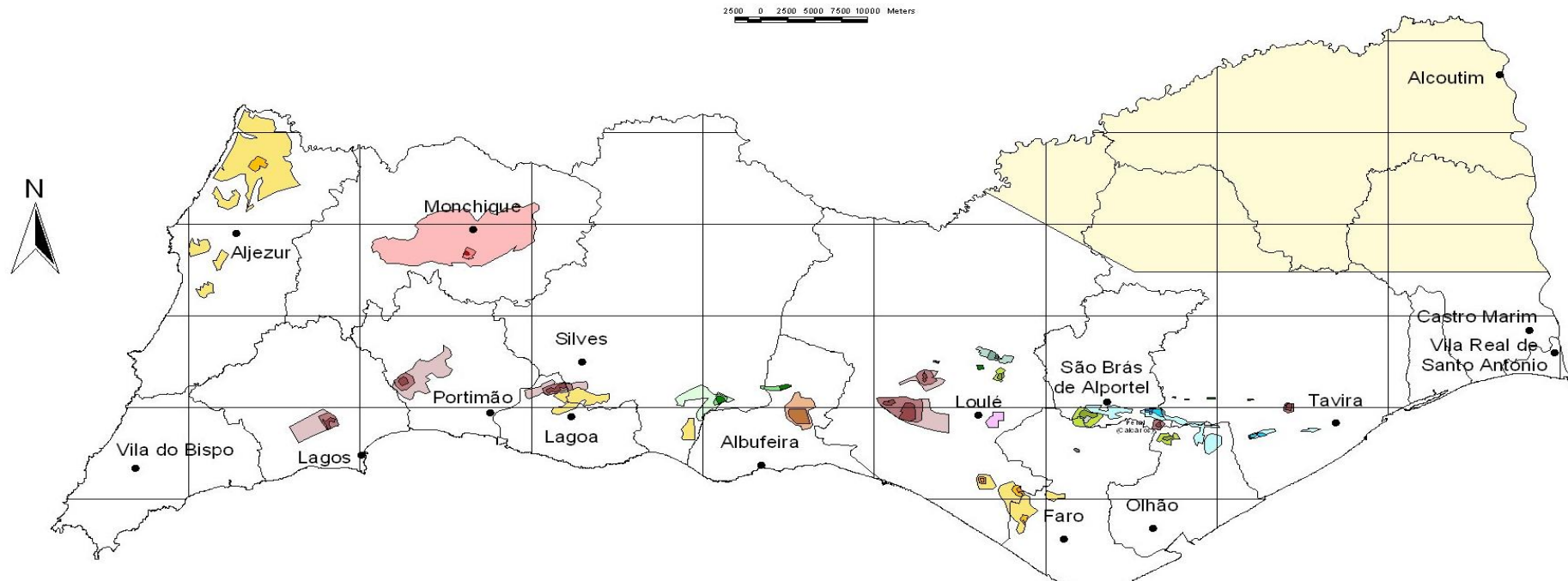
**Municipal Land
Management Plans
presently (10Feb15)
under monitoring by
DGEG
(211 PDM's = 76% of
total)**





Instituto Geológico e Mineiro
Ministério da Economia

CARTA DE ORDENAMENTO SECTORIAL DA REGIÃO DO ALGARVE



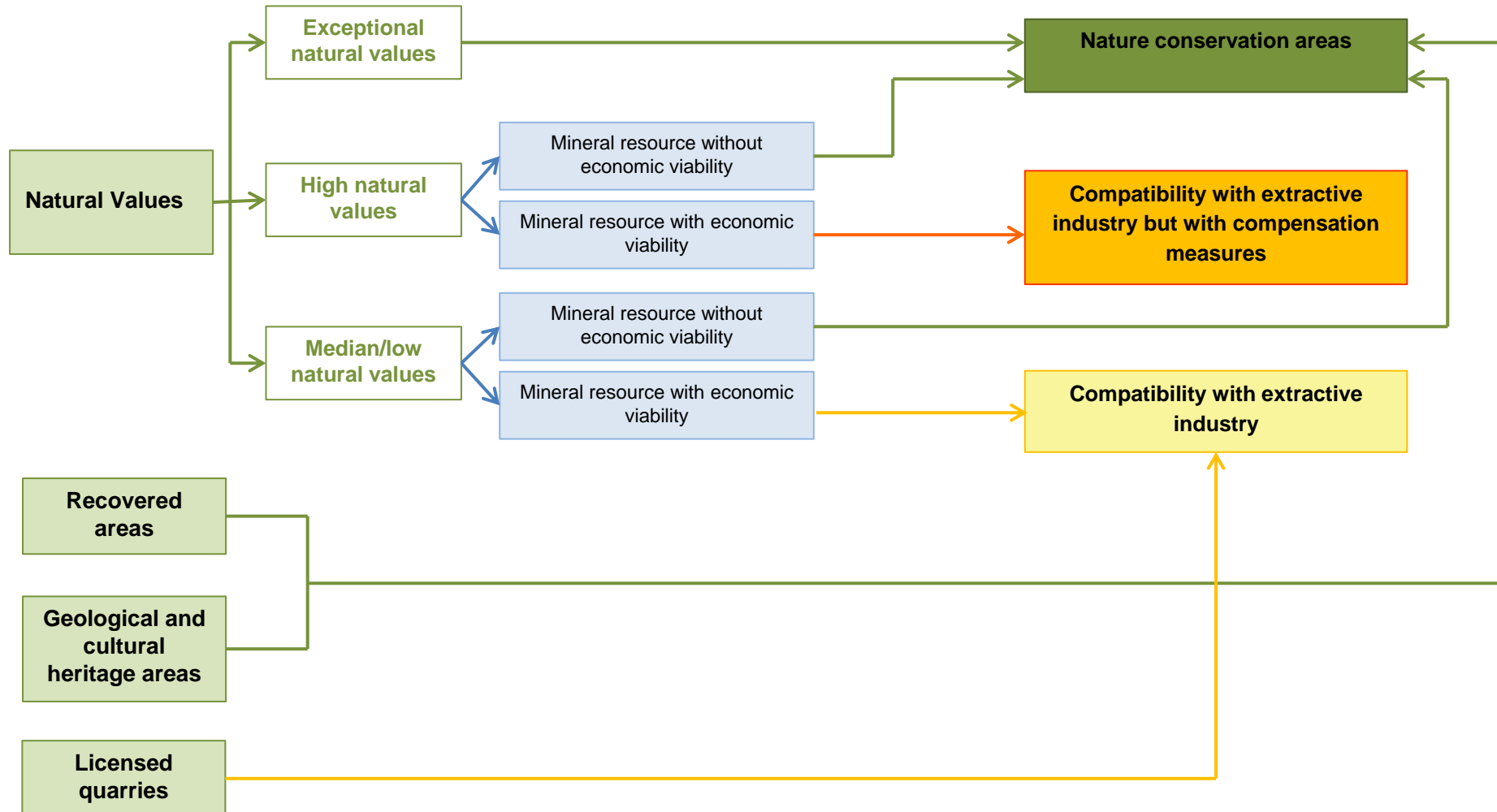
LEGENDA

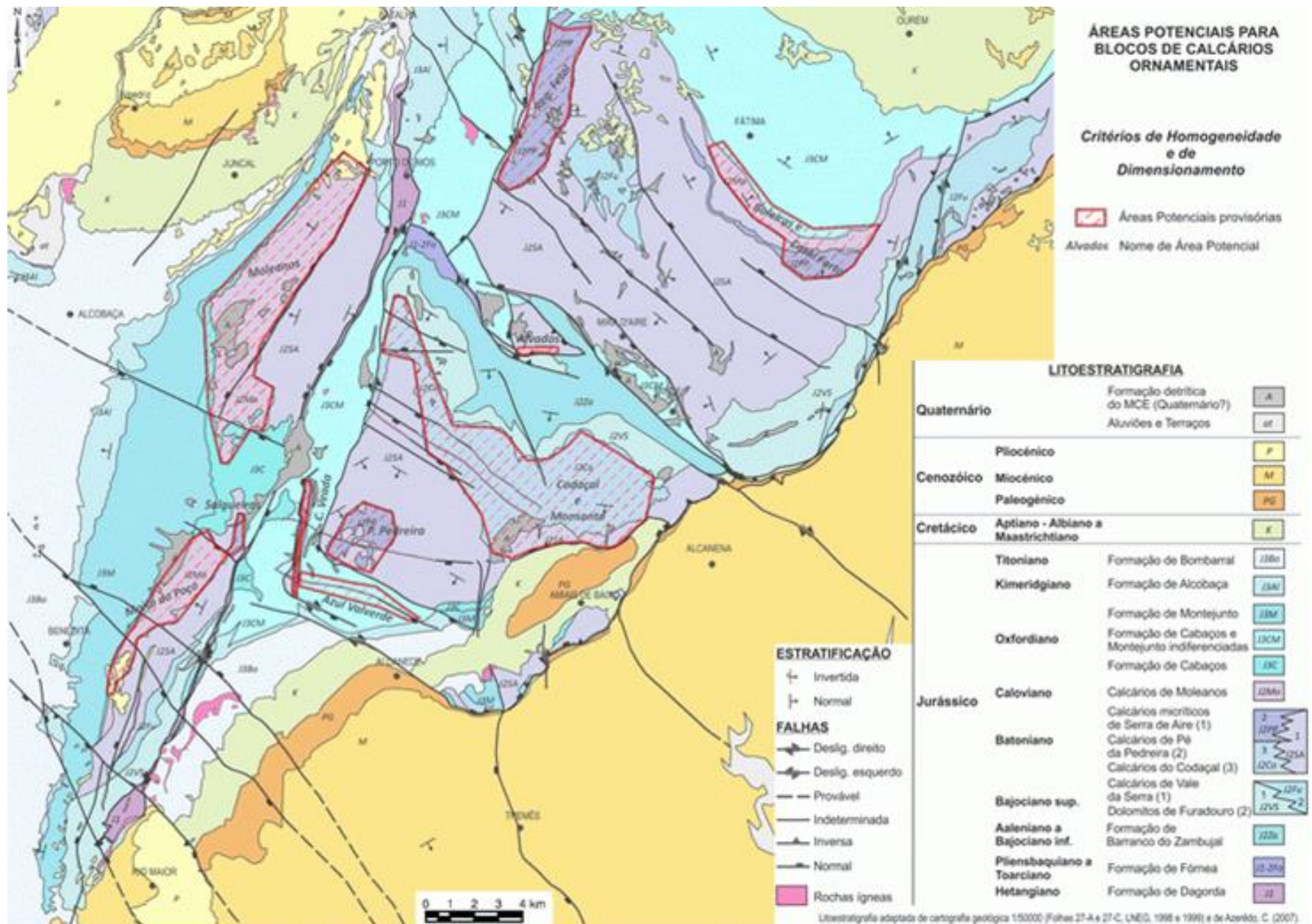
Áreas Consolidadas	Áreas Complementares	Áreas Potenciais	Áreas a receber
<ul style="list-style-type: none"> Areias Argilas Calcários Industriais Calcários Industriais, Ornamentais e Calçada Calcários Ornamentais Calcários para Calçada Gesso Granitos Metamórficos Mármore Silício 	<ul style="list-style-type: none"> Areias Argilas Calcários Industriais Calcários Industriais, Ornamentais e Calçada Calcários Ornamentais Calcários para Calçada Gesso Granito Metamórfico Mármore 	<ul style="list-style-type: none"> Areias Argilas Calcários Industriais Calcários Ornamentais Granitos Metamórficos Mármore Sulfureto de Cálcio, Polimetalos 	<ul style="list-style-type: none"> Calcários Industriais Calcários para Calçada

ARTAMENTO DE PROSPECÇÃO DE ROCHAS
E MINERAIS NÃO METÁLICOS
NOVEMBRO DE 2002
Patrícia Falé e Paulo Henriques

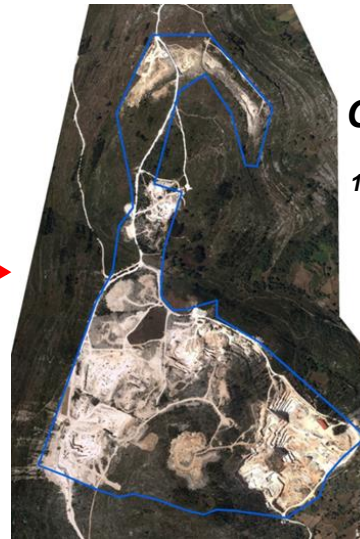
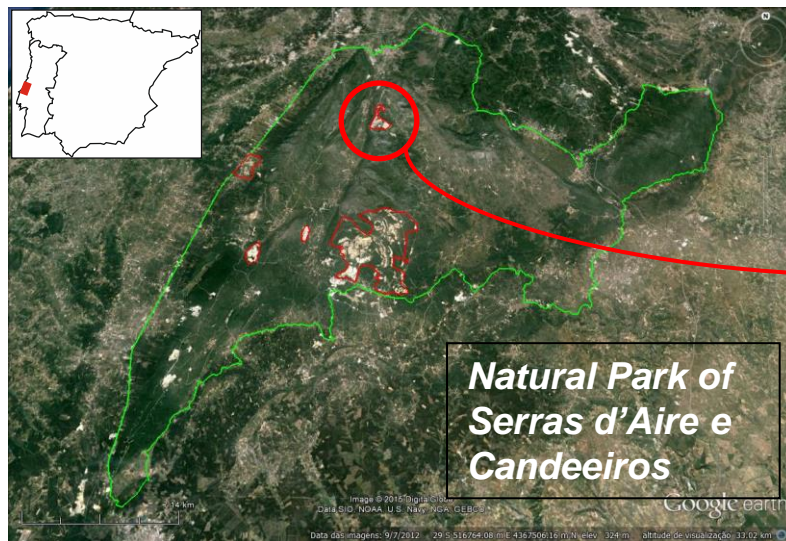
Methodology used in land planning

Project Environmental Sustainability of Extractive Industry / Sustainable Exploitation of Resources in Natura 2000 Network

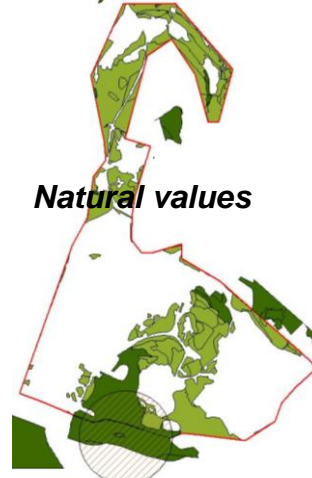
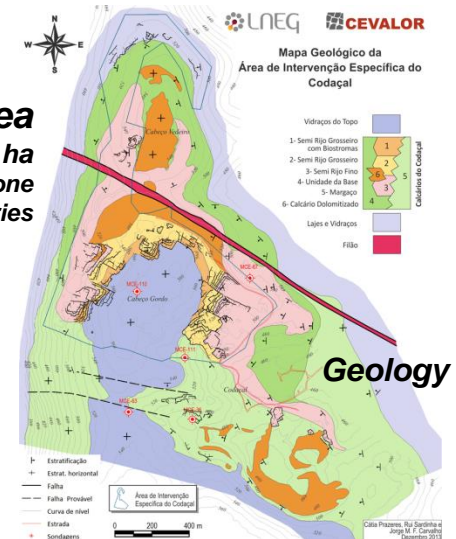




CASE STUDIES

Environmental Sustainability of Extractive Industry;
Sustainable Exploitation of Resources in Natura 2000 Network

Codaçal Area
98 ha
19 ornamental stone
quarries

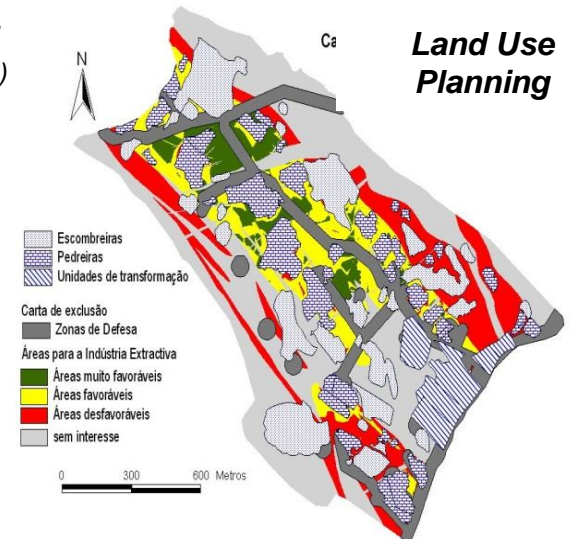
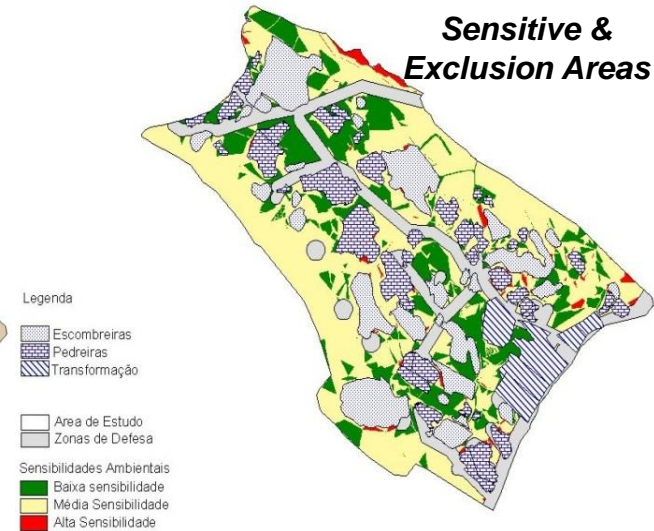
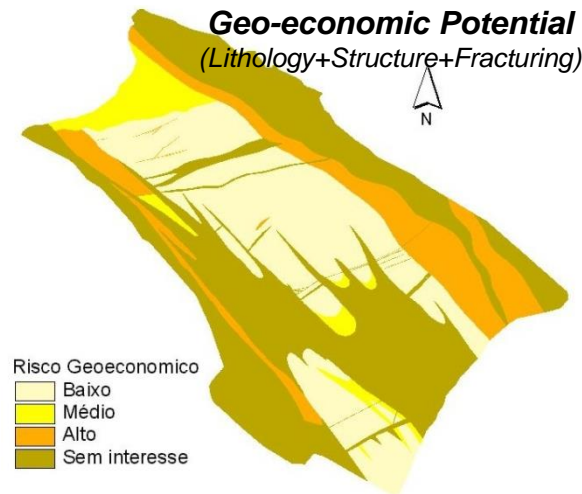
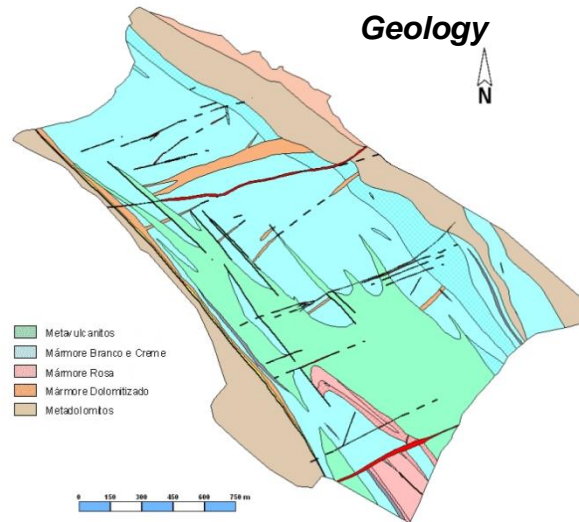


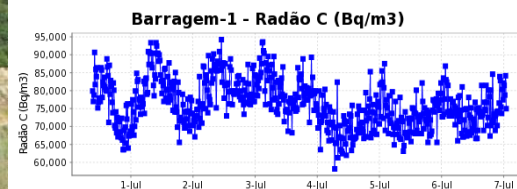
Mineral resource	Exceptional or high natural values	Land Class
Yes	No	Compatibility with extractive industry
Yes	Yes	Compatibility with extractive industry but with compensation measures
No	Yes or No	Nature conservation areas

The Estremoz-Borba-Vila Viçosa Marbles; Thematic mapping as a tool to land management and support to mining industry

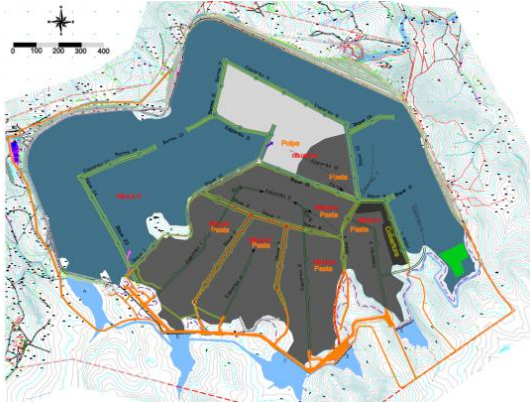


Underground exploitation

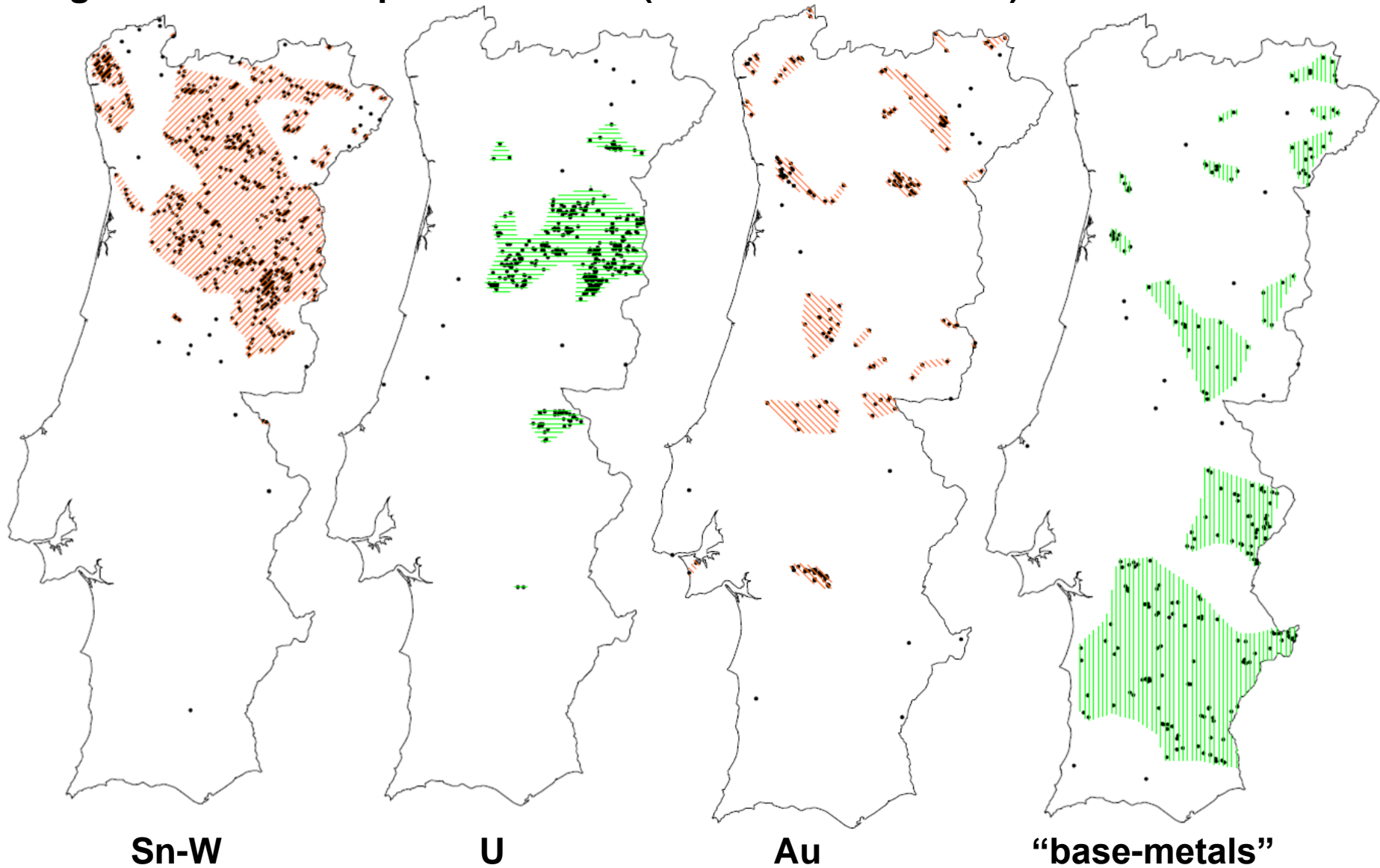


Before**Urgeiriça Mining Area (uranium) Rehabilitation****During****After****Before****After****Urgeiriça Old Dam Waste Dumps****Urgeiriça Chemical Treatment Facility****Radon Gas Continuous Monitoring**

Tailings disposal at Neves-Corvo Mine - Paste Deposition



- For the first time in Europe, in Neves-Corvo:
 - › paste from high sulphide tailings is produced and prepared for sub-aerial disposal, switching from sub-aqueous disposal in a dry climate in an unlined site.
 - › depositional “cells” are being created to concomitantly store paste and acid generating waste rock. The cover is designed to maintain high saturation levels and reduce high generation source.

Rough delimitation of potential areas (to be further detailed) for:



Number of countries : 14.

Number of Researchers : 77 (Argentina- 9; Venezuela- 1; Colombia- 8; Bolivia- 2; Cuba- 6; Spain- 12; Ecuador- 8; Portugal- 9; Guatemala- 1; Brazil- 10; Chile- 2; Peru- 5; México- 3; Dominican Republic- 1).

Number of institutions : Argentina- 6; Venezuela- 1; Colombia- 8; Bolivia- 2; Cuba- 2; Spain- 9; Ecuador- 5; Portugal- 7; Guatemala- 1; Brazil- 7; Chile- 2; Peru- 5; México- 3; Dominican Republic- 1.

Generated projects : 1 research project and 1 IBEROEKA project.

Other Actions : co-organization and participation in 9 workshops and participation in 1 more; co-organization and participation in 10 seminars and participation in 10 more; co-organization and participation in 1 IBEROEKA Miniforum and participation in 1 more; co-organization and participation in 4 courses.

Books : 8 in digital format (CD-ROM); 2 in paper; web pages (www.xiie.org).

The [overall objective of MINATURA2020](#) is to develop a concept and methodology for the definition and subsequent protection of “mineral deposits of public importance” in order to ensure their “best use” in the future in order to be included in a harmonized European regulatory/guidance/policy framework. Providing a policy-planning framework that comprises the “sustainability principle” for mining like for other land uses is the key driving force behind MINATURA2020.

MINATURA2020 is a 3-year EU funded project that relies on the strength of an international consortium of [24 partners](#). All project partners have a demonstrated record of accomplishment of projects at national, international and commercial level. They are active players in the international raw materials community, part of a well-established network and cover different domains (public and regulatory authorities, industry, academics, civil society, etc.).

WHY NOT A MINATURA COOPERATION PROJECT BETWEEN EU AND LATIN AMERICA?

HORIZON 2020 call?

Budget of approximately 1 M €?



"Vision without action is just a dream, action without vision just passes the time, but vision with action can change the world."

Nelson Mandela

Thank you for your attention!
Muchas gracias!
Muito obrigado!

For more information, please contact:

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