

National Laboratory on Energy and Geology



Mission and Vision

- LNEG is a State laboratory within the Ministry of Environment, Spatial Planning and Energy (MAOTE).
- Main activity on R&D oriented to the needs of society and enterprises by investing in a sustainable research, along with the international best practices, ensuring that the areas of expertise allow an adequate response to the needs of the business sector.
- LNEG's mission is to promote technological innovation, science and technology oriented for economic development, contributing to increase competitiveness of economic agents in the context of sustainable progress of the Portuguese economy.
- Networking and excellence towards society recognition is our Vision, working to be within the best.





Energy Production Systems: Wind; Solar Thermal; Photovoltaic; Solar Concentrated; Geothermal; Waves; Biomass, ...

- Energy Production Systems
- Energy Efficiency
- Energy Analysis
- New Trends and Innovation
- Endogenous Resources
- Geological Hazards and Environment
- Geology for a Sustainable Territory

highlights

Driving the energy transition together was the main theme of this year's SET Plan Conference, which included LNEG as a key participant
 The 7th Strategic Energy Technology Plan (aka SET-Plan) took place in Rome, 10-11 December, and included the participation of Teresa Ponce de Leão, President of LNEG and Vice Chair of EERA

International Innovation | Interview with Teresa Ponce de Leão, President of LNEG
 Interview published under the "Research and Innovation World Congress - Oceans" | International Innovation Issue 159: Sensing Change

India and Portugal have decided to cooperate in the area of renewable energy
 The two countries plan to undertake joint research and development projects focused on assessment of wave, wind offshore, geothermal resources and smart integration of renewable energy in the grid in India.

know us



LNEG Activities

LNEG develops R&D activities in the main areas of Energy and Geology

- Renewable Energy
- Energy Efficiency
- Innovative Strategic Technologies
- Endogenous Resources
- Geological Hazards and Environment
- Geology for the Territorial Enhancement



Public Policy Support

- Implementation of EU Directives
- National Plans (Renewable Energy and Energy Efficiency)
- Raw Materials Strategy
- Technical support in master plans
- Technical support to governmental mining concession

GeoPortal

GeoPortal is a spatial data infrastructure.

Allows research, consultation, analysis and acquisition of scientific and technical information in the areas of Energy and Geology.



Some examples:

- Drilling data bases
- Map Viewer and mapping at different scales
- Wind maps, the North Sea, Baltic Sea and Irish Sea
- Atlas of Potential Wind Onshore
- Atlas of CO₂ storage (Portugal, Spain and Morocco)
- Radiometric map



Geological Data

LITOTECA - National Archive for samples and Geological Data

Support research infrastructure in Geosciences

- Preservation and conservation of scientific collections and geological data
- Centralization, integrity and consistency of sampling
- Availability, ease and convenience in the study of collections
- Re-use of samples and data



Networking

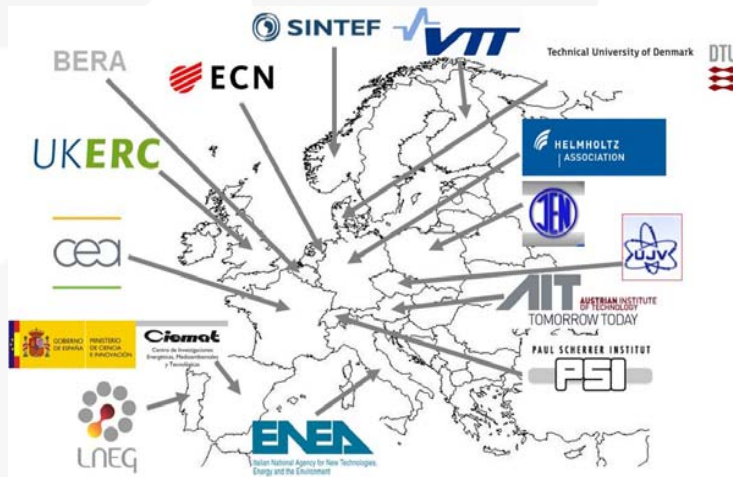
LNEG

ENERGY
European Energy
Research Alliance

EERA

EGS

GEOLOGY
European Geological
Surveys



>3.000 ETI



EGS Membership

>10.000 Scientists

> 1 Bilião € / year



Networking

LNEG is aware that cooperative work and networking can optimize skills and that knowledge sharing is a tool for success, so it is an active partner of the major networks and collaborative platforms in the areas of energy and geology.

[EERA - European Energy Research Alliance](#)

[EGS – EuroGeoSurveys](#)

[ESEIA - European Sustainable Energy Innovation Alliance](#)

[IEA - International Energy Agency](#)

[IRENA – International Renewable Energy Agency](#)



Accredited Laboratories

LNEG has a set of laboratories accredited by the Portuguese Institute for Accreditation, which act in accordance with the NP EN ISO 17025:

[Laboratory of Biofuels and Environment](#), which focuses its activity on the analytical methodologies for biofuels and solid and liquid fuels;

[Laboratory of Materials and Coatings](#), which is a center specialized in the areas of characterization, corrosion / degradation and corrosion protection materials.

[Laboratory of Solar Energy](#), which focuses on testing of Solar Thermal Collectors and Systems;

[Mineral Science and Technology Unit](#), with activities in mineralogy and chemical characterization of geological materials and technology, microanalysis and trace analysis of new materials as well as in mineral processing.



Certification ISO 9001 and NP 4457



**THE INTERNATIONAL CERTIFICATION NETWORK
CERTIFICATE**

IQNet and
AENOR
hereby certify that the organization

LABORATÓRIO NACIONAL DE ENERGIA E GEOLOGIA, IP

b) BIBLIOTECA - ESTRADA DA PORTELA, BAIRRO DO ZAMBUIAL, APARTADO 7595, 2610-999 ALFRAGIDE Portugal
a) MUSEU GEOLÓGICO - ACADEMIA DAS CIÊNCIAS, 14 5 LISBOA Portugal

for the following field of activities

Knowledge transfer in Energy and Geology, through activities:

- a) Conservation, registration, classification and geological specimens exhibition to the public; support for geological higher education in particular tertiary-level and post doctoral studies; editing and publishing scientific journals - "geological communications" and "geological memories", with recognition of national and international scientific community and;
- b) Availability of National, European and global level scientific evidence and international databases of scientific research in the fields of energy and geology.

has implemented and maintains a

Quality Management System

which fulfils the requirements of the following standard

ISO 9001:2008

First issued on: 2014-12-31 Validity date: 2017-12-31

Registration Number: **ES-0824/2014**



AENOR Asociación Española de Normalización y Certificación

Michael Drexler
President of IQNet

Analiso BRITO
Chief Executive Officer

AENOR Spain: AFNOR Certification France: AIB: Vincete International: Belgica: ANCS: Mexico: APQR: Portugal: CCC: Cyprus: CIBQ: Italy: CQC: China: CQM: China: CQS: Canada: Sijpakko: Cro-Cert: Croatia: DQS: HOLLAND: GmbH: Germany: FCAV: Brazil: FONDO: NORMA: Venezuela: ICORTIC: Colombia: IMNC: Mexico: Inspecta: Certification: Finland: IRAM: Argentina: JQA: Japan: KIP: Korea: MINTEC: Greece: MSST: Hungary: Nerako: AS: Norway: NSAI: Ireland: PCBC: Poland: Quality: Austria: Austria: BE: Bureau: SEI: Israel: SIO: Slovenia: SIRIM: QAS: International: Malaysia: SQS: Switzerland: SRAC: Romania: TEST: St. Petersburg: Russia: TSE: Turkey: TÜRK: Serbia: IQNet is represented in the USA by: AFNOR Certification, CIBQ, DQS Holding GmbH and NSAI Inc.

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com



Certificado de Conformidade
Certificate of Registration
PT14/05063

O Sistema de Gestão da Organização
LNEG - Laboratório Nacional de Energia e Geologia, I.P.

Estrada da Portela, Bairro do Zambujal - Alfragide, Apartado 7595
2610-999 AMADORA

« Delegação no Campus do Lumiar, Campus de S. Mamede da Infância, Centro de Estudos Geológicos e Mineiros do Beja e Museu Geológico

foi auditado e cumpre com os requisitos da norma
NP 4457:2007

Peelas actividades de:
Investigação Científica, Desenvolvimento Técnico e Tecnológico e Inovação nos domínios da Energia e Geologia.

Este certificado é válido desde
This certificate is valid from
22 de dezembro de 2014 até 21 de dezembro de 2017,
sujeito a auditorias de acompanhamento com resultados satisfatórios
22nd December 2014 until 21st December 2017, and remains valid subject to satisfactory surveillance audits
Auditoria de Renovação a realizar antes de 21 de outubro de 2017
Its certification audit due before 21st October 2017
Versão 1. Certificado pela SGS desde dezembro de 2014
Issue 1. Certified with SGS since December 2014



IPAC
acreditação
A0003
Certificação
Sistemas de Gestão

Autorizado por:
Authorized by

Luís Neves *Isabel Berger*
Luís Neves Isabel Berger
Direção de Certificação Certification Management

SGS ICS - Serviço Internacional de Certificação
Pia: Termonop de Lisses Estrada 1 - 1800-060 Lisboa
T: 21 714 00 00 F: 21 71 67 07



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HR Excellence in Research

European Charter for Researchers & Code of Conduct for the Recruitment of Researchers

In 2010, LNEG adhered to the principles of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers. LNEG was the first Portuguese institution to be awarded Excellence logo on Human Resources Research by the European Commission.



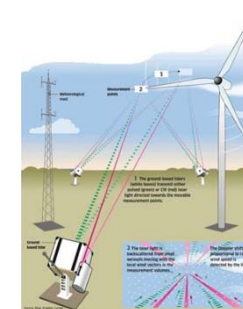
HR EXCELLENCE IN RESEARCH



LNEG Infrastructures

LNEG in the National Research Infrastructures Roadmap

- [Biomass and Bioenergy Research Infrastructure \(BBRI\)](#)
- [Collaboratory for Geosciences \(C4G\)](#)
- [Research Infrastructure on Integration of Solar Energy Systems in Buildings \(NZEB LAB\)](#)
- [Portuguese WindScanner Facility \(Windscanner.PT\)](#)
- [National Research Infrastructure Solar Energy Concentration \(INIESC\)](#)





Research Infrastructure on Integration of Solar Energy Systems in Buildings



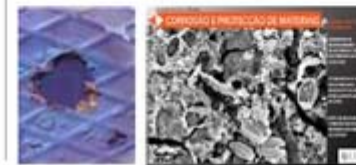
LNEG



SOLAR XXI
nearly Zero Energy Building



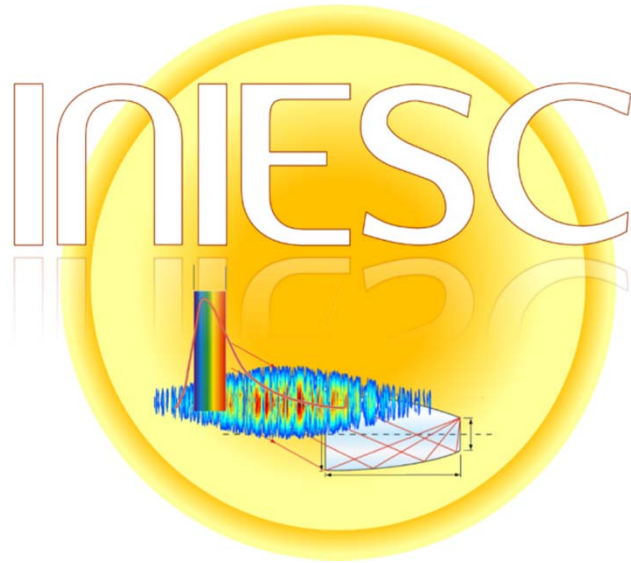
LES
Solar Energy Laboratory
(certified laboratory since 1993)



LMR
Materials and Coating Laboratory

Lógica
PV Laboratory





National Research Infrastructure on Solar Energy Concentration

Action Plan

- A1: Solar concentrators for thermal conversion of solar radiation
- A2: Standardized methods and experimental testing of solar concentrators
- A3: Solar Energy Storage
- A4: Solar fuels
- A5: Applications and system demonstration
- A6: Solar materials and components
- A7: Promotion and dissemination
- A8: Training and Capacity building



Project Portfolio

<http://www.lneg.pt/download/9138/index.html>



The screenshot shows a webpage for LNEG's Project Portfolio. At the top left, there is a vertical grey bar with the text "Project Portfolio" and a small white circle. The main content area features the LNEG logo at the top right, which consists of a cluster of grey circles with a red and yellow circle in the center, followed by the text "LNEG" and "Laboratório Nacional de Energia e Geologia, I. P." below it. A horizontal line separates the logo from the "Research Areas" section. The research areas are listed as follows: Energy Production Systems, Energy Efficiency, Energy Analysis, Geology for a Sustainable Territory, Endogenous Resources, and New Trends and Innovation. At the bottom right of the page, there is a copyright notice "© LNEG 2014" and a small arrow icon pointing downwards.

● Project Portfolio ●

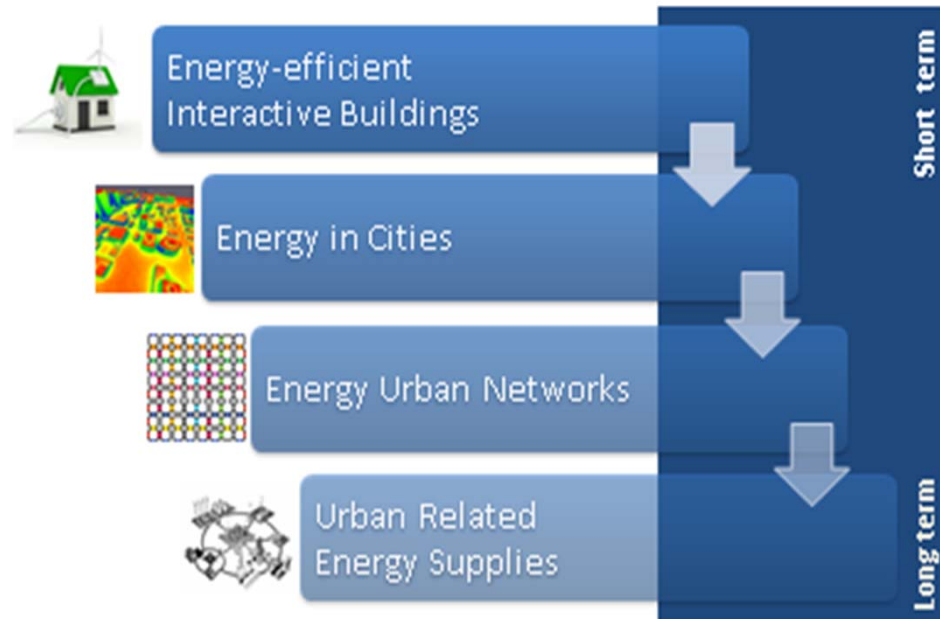
Research Areas

- Energy Production Systems
- Energy Efficiency
- Energy Analysis
- Geology for a Sustainable Territory
- Endogenous Resources
- New Trends and Innovation

© LNEG 2014



Smart Cities



SusCity: Urban data driven models for creative and resourceful urban transitions

MITP-TB/C S/0026/2013 (FCT-MIT USA collaboration)

Solar Energy

International research projects

Recent International research projects:

EU-SOLARIS - The European SOLAR Research Infrastructure for Concentrating Solar Power

STAGE-STE: Scientific and Technological Alliance for Guaranteeing the European Excellence in Concentrating Solar Thermal Energy

OPTS: OPTimization of a Thermal energy Storage system with integrated Steam Generator

CHEETAH - Cost-reduction through material optimisation and Higher EnErgy output of solar pHotovoltaic modules.

SUSMILK - Re-design of the dairy industry for sustainable milk processing

DURASOL: Solar Thermal Collectors Durability with focus on the influence of maritime environment.



Solar Energy

Solar Photo Voltaic

PV System monitoring

Solar XXI BIPV from LNEG



CPV system
MAGPOWER/ GENERG

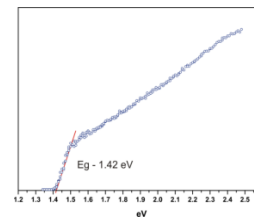
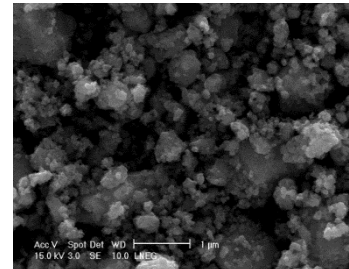


PV R&D on Conversion processes and new Products

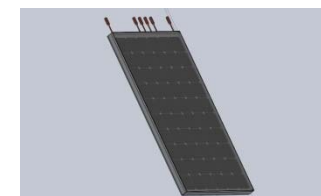
DSSC and Solid state cells



CTS technology



New PV/T collectors

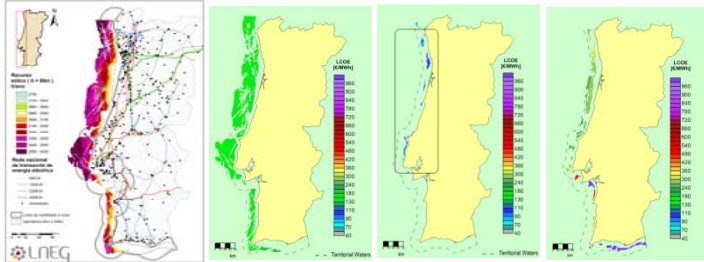


Wind Energy

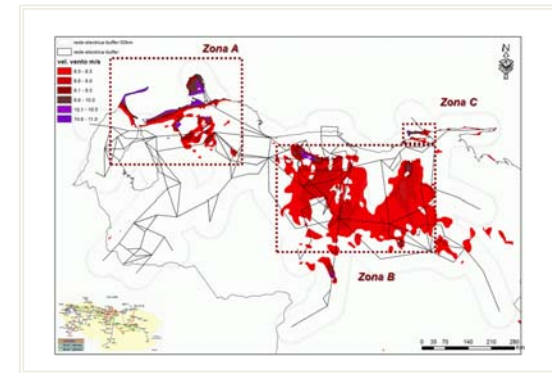
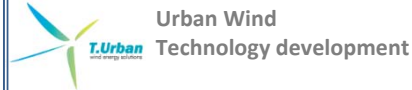


The IEE Seanergy 2020

The FCT project RoadMap WW
Methodologies for Design, Monitoring
Update Development Strategies

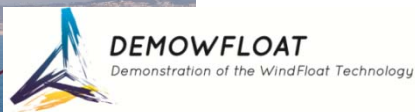


Full-scale Laser Facility for Wind and
Turbulence Measurements around
large Wind Turbines.

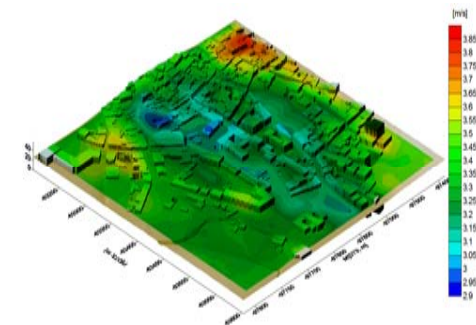
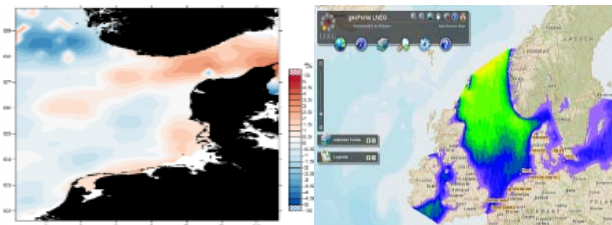


GIS application for the
identification of suitable
areas for wind energy
exploitation

Project Demowfloat



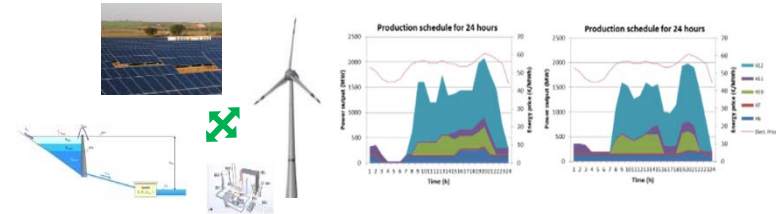
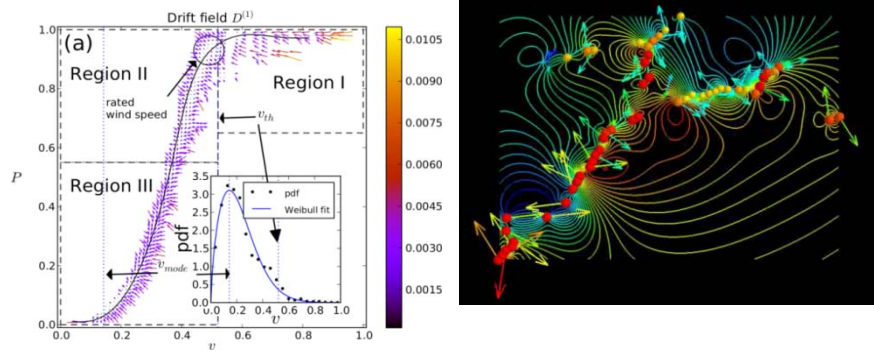
Project NORSEWInD



GIS application for the
identification of wind resource in
urban areas

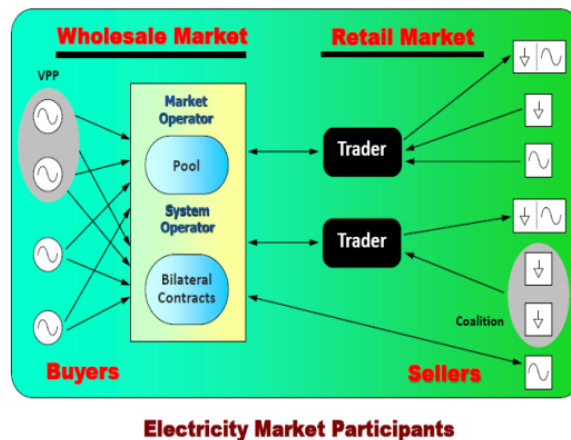
Wind Energy

fluct.Wind: Wind power fluctuation characterization and categorization by time-spectra wavelet analysis

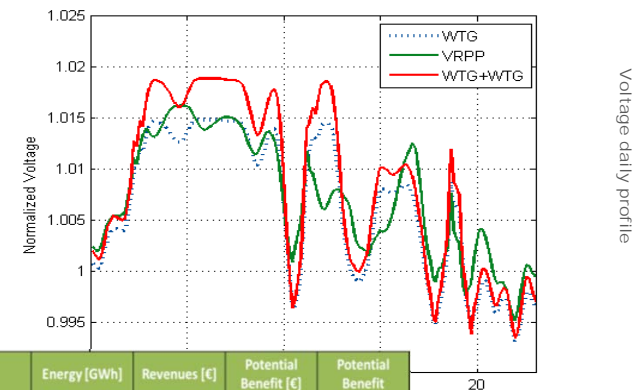


MixEnergy: Planning and Scheduling of Optimal Mix of Renewable Sources in Sustainable Power Systems.

MAN-REM: Multi-Agent Negotiation and Risk Management in Electricity Markets



Dynamic Modeling of Wind Power Plans. Operation of Power Systems with Large Amounts of Wind Power.



	Energy [GWh]	Revenues [€]	Potential Benefit [€]	Potential Benefit
WTG	16,87	1 582 617	-	-
WTG+WTG	20,21	1 899 858	317 241	20,05%
VRPP (WTG+PV)	20,44	1 930 426	347 810	21,98%
VRPP + BESS 3 MWh	20,43	1 940 713	358 096	22,63%
VRPP + BESS 6 MWh	20,31	1 946 558	363 941	23,00%
VRPP + BESS 8 MWh	20,27	1 950 806	368 189	23,26%

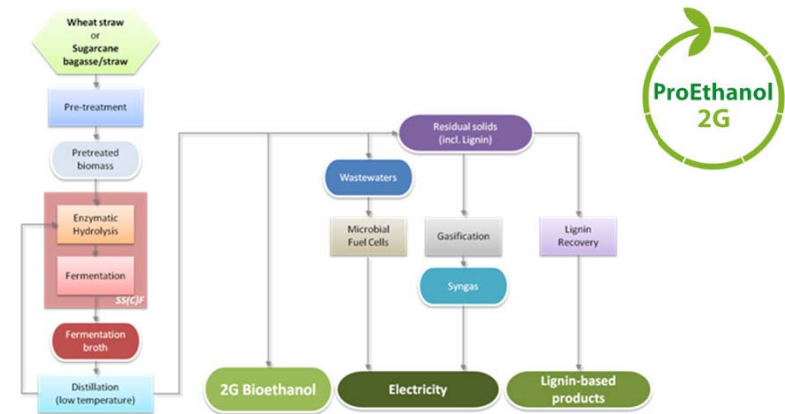
Biochemical Conversion of Biomass to Advanced Biofuels

Recent research projects:

GR³ (GRass as a GReen Gas Resource).
 Energy from landscapes by developing the market for grass wastes as a renewable energy resource
 (IEE/12/046, 2013-2016)



PROETHANOL2G – Integration of Biology and Engineering into an Economical and Energy-Efficient 2G Bioethanol Biorefinery – 7thFP (2010-2014).

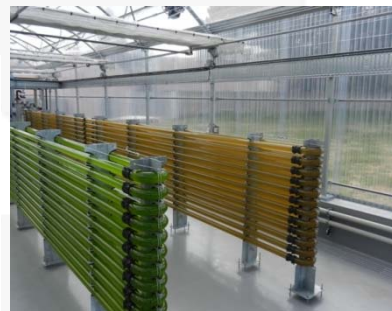
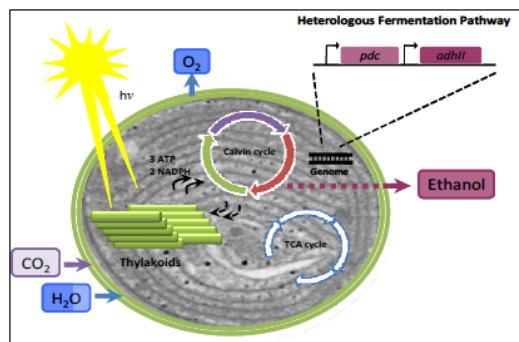


1-CIAB
 1er. CONGRESO
 IBEROAMERICANO
 SOBRE BIORREFINERIAS



MICROALGAE

DEMA- Direct Ethanol from MicroAlgae
 (7thFP, 2013-17)



WW-SIP - From Urban Wastewater Treatment Plant to Self-Sustainable Integrated Platform for Wastewater Refinement (LIFE, 2012-2015)



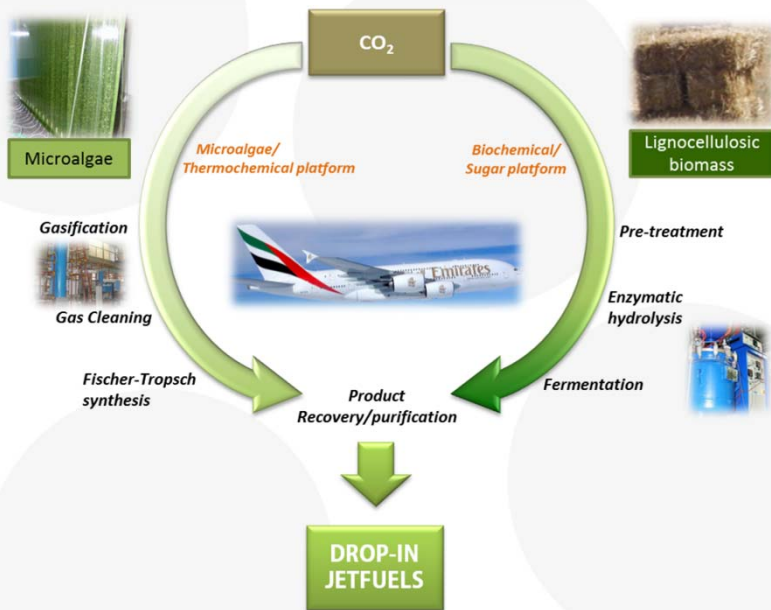
LIFE10 ENV/IT/000308



Thermochemical Conversion to Advanced Biofuels

Recent research projects:

**ADVANCED BIOFUELS FOR AVIATION:
Mixed Thermochemical + Biochemical
conversion of microalgae biomass**



**PTDC/AGR-FOR/3872/2012-ENERSTUMPS-
Biomassa subterrânea do Eucalyptus globulus –
FCT (2013-2015)**

**GASBIOREF - Gasification of Biofuels
and Recovered Fuels – 7thFP (2010-14)**



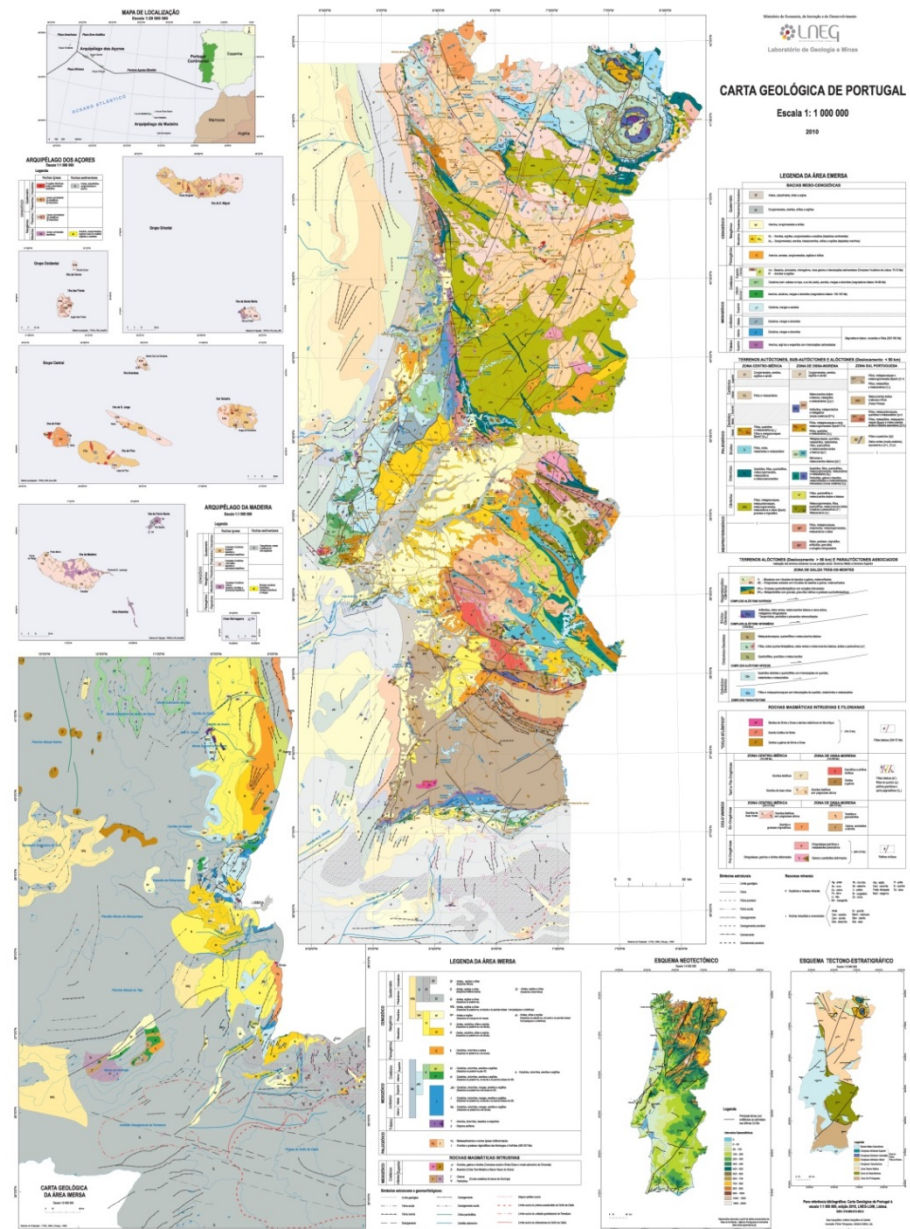
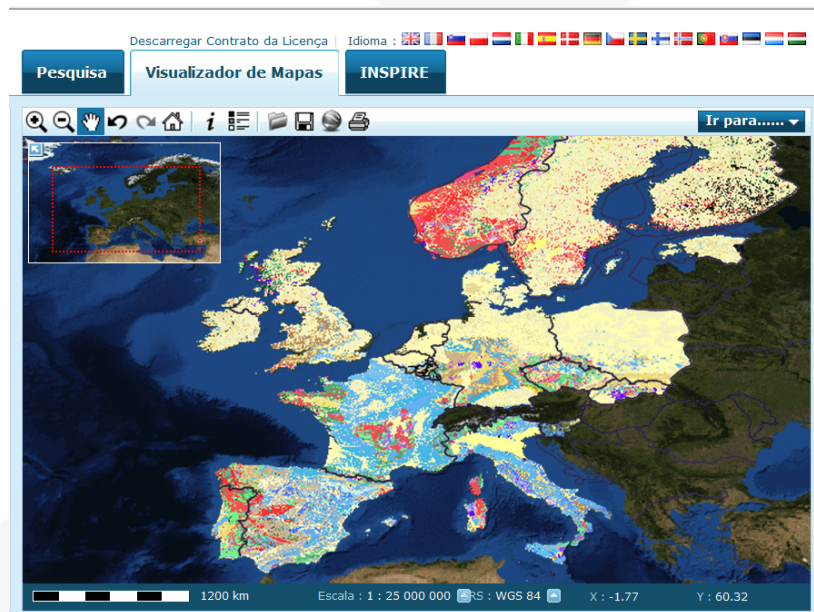
**PTDC/AAG-REC/3477/2012-RICEVALOR-Energetic valorisation of
wastes obtained during rice production in Portugal – FCT(2013-15)**



Geological Mapping

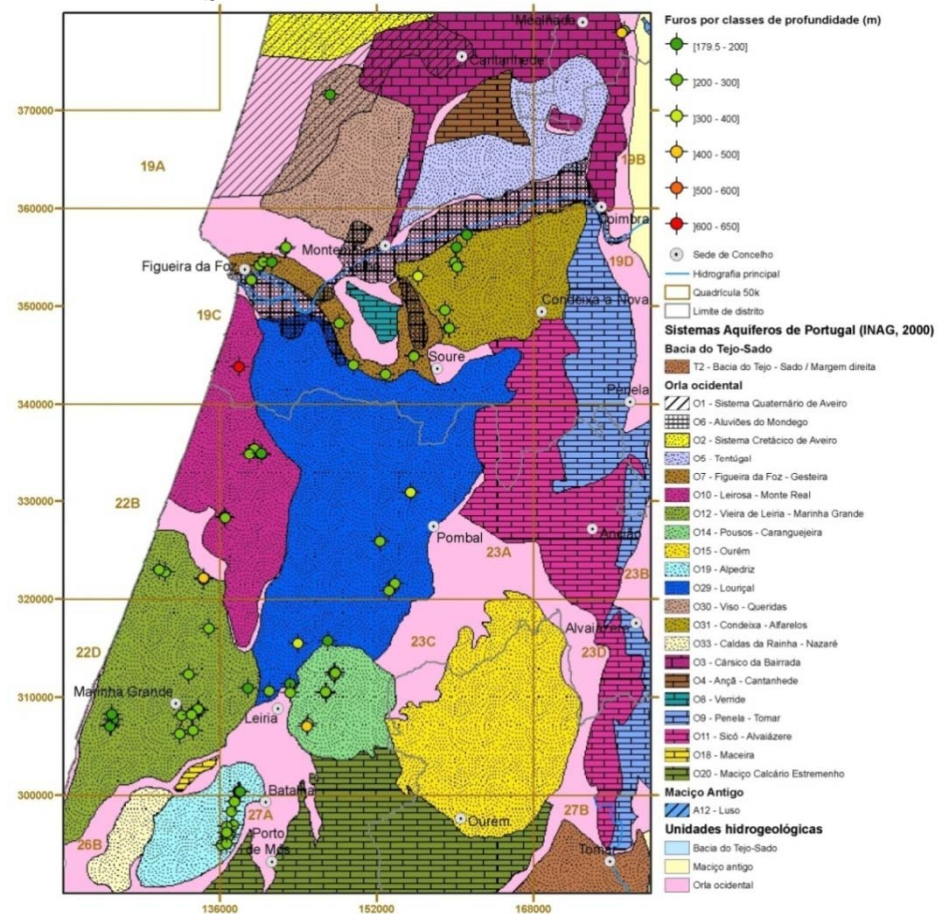
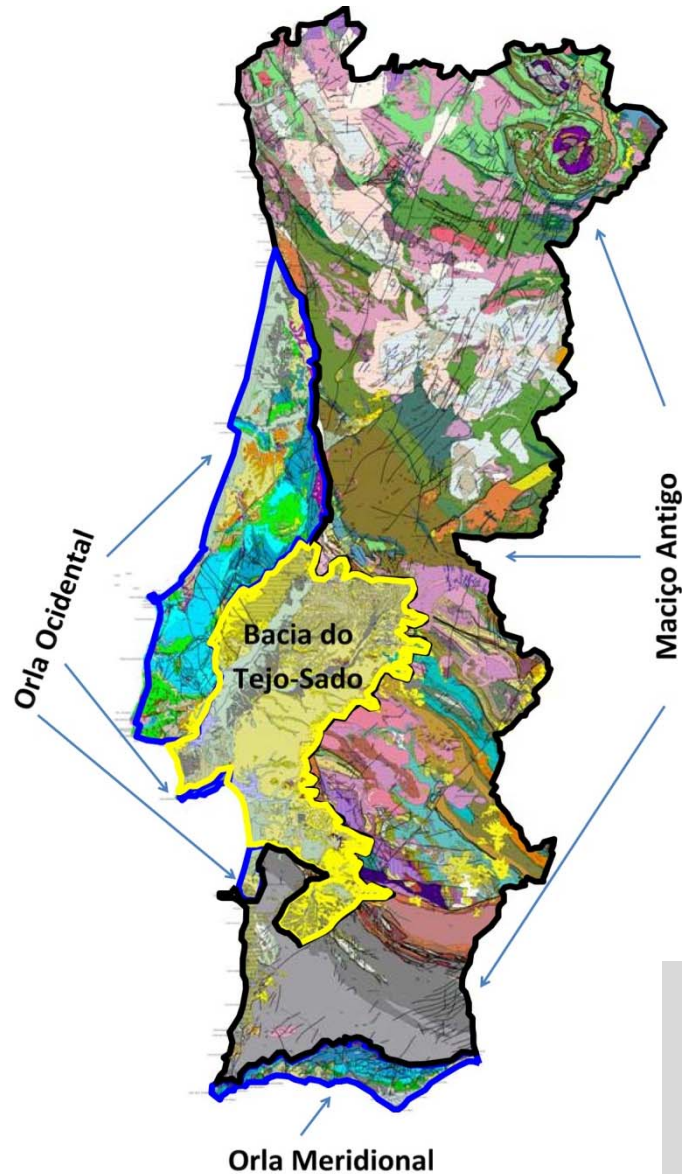
- 1/50k, 1/200k, 1/500k
- NEW EDITION 1:1M – 2010
- INSPIRE Directive
- GEOPORTAL - on line platform
- One Geology

<http://onegeology-europe.brgm.fr/geoportal/>



Hidrogeological Mapping

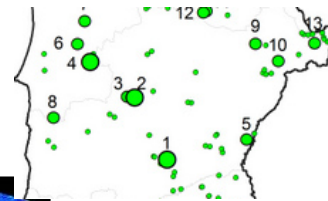
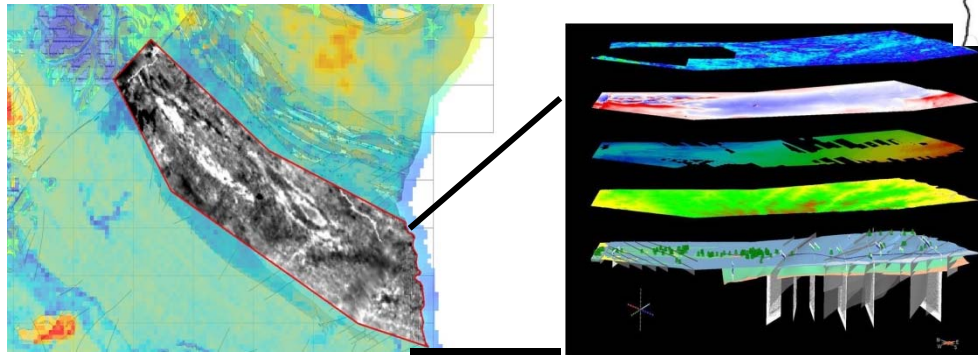
Main aquifer systems in Portugal Continental (Almeida et al., 2000)



IMAGES Project (strategic management of Groundwater in emergency situations)
 Chemical and isotopic analysis - residence times $k = 22$ years
 Refills of exceptional quality
 Strategic reserves of fresh water
 low vulnerability

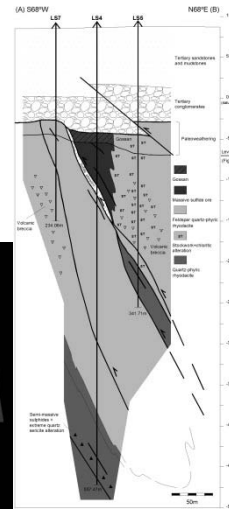
Mineral Resources – Iberian Pyrite Belt

- **PROMINE** – Nano-particle products from new mine resources in Europe
2D Seismics+ 3D modelling (GoCAD)

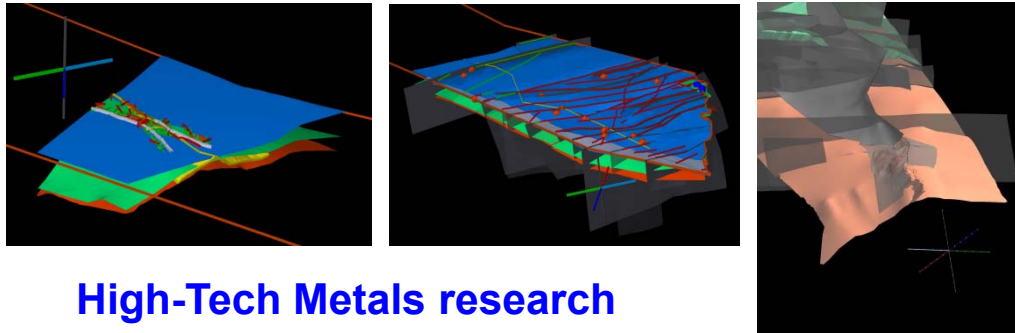


Lagoa Salgada

S. Domingos Mine



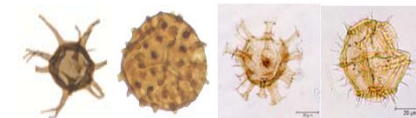
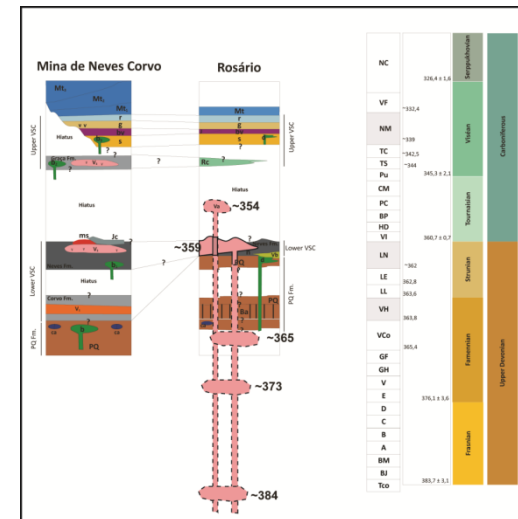
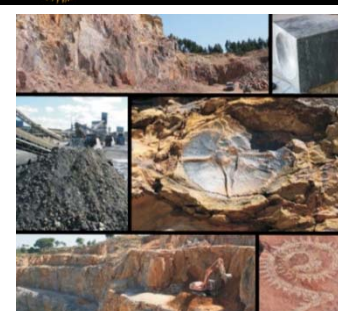
Palinology and detailed geological mapping supporting the mineral exploration



High-Tech Metals research



MinRemol



Mineral Resources – other raw materials

Mineral Resources – Non-Metallic

NATURAL STONE CLUSTER
ENVIRONMENTAL SUSTAINABILITY IN
EXTRACTIVE INDUSTRY

ASSIMAGRA

QREN/COMPETE/SIAC-COLECTIVE ACTIONS
INCENTIVE

LNEG - CEVALOR

MAPPING POTENTIAL ECONOMIC RESOURCES OF
SPECIAL CLAYS AND CAULINES IN PORTUGAL

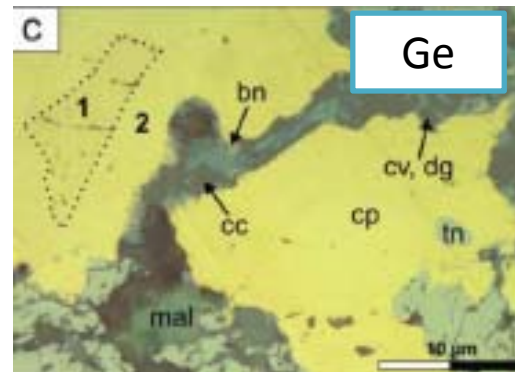
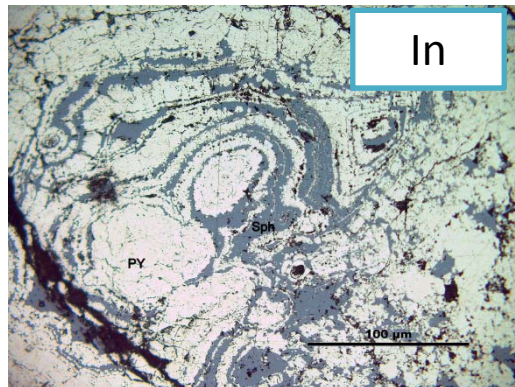


Áreas Potenciais em Caulinos

- Formações Mio-Plio-Plistocénicas
- Formações Cretácicas
- Rochas Ígneas Intrusivas

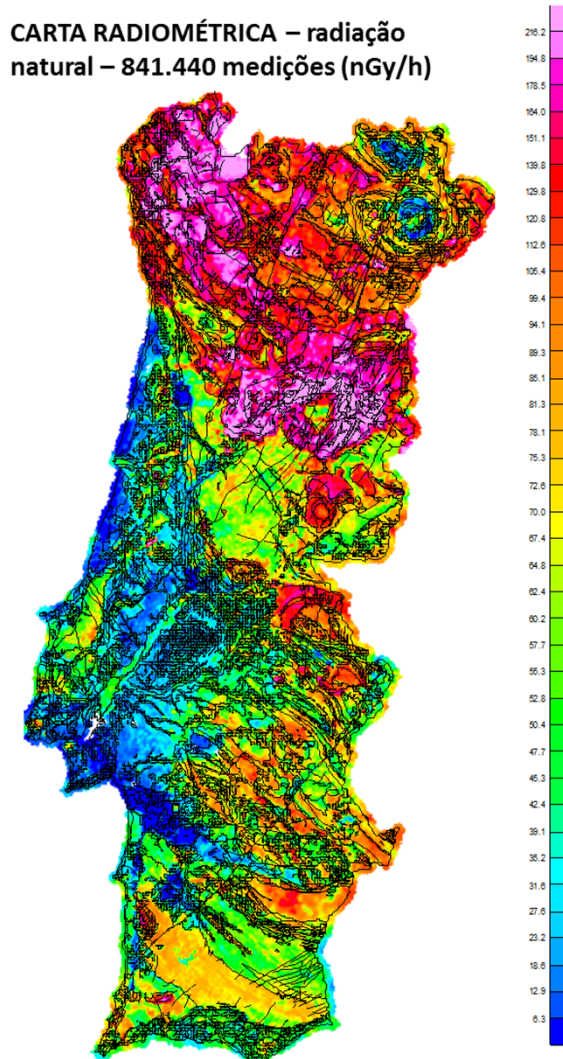


CRITICAL RAW MATERIALS



Mineral Resources – Radioactives

- CARTA RADIOMÉTRICA – radiação natural – 841.440 medições (nGy/h)

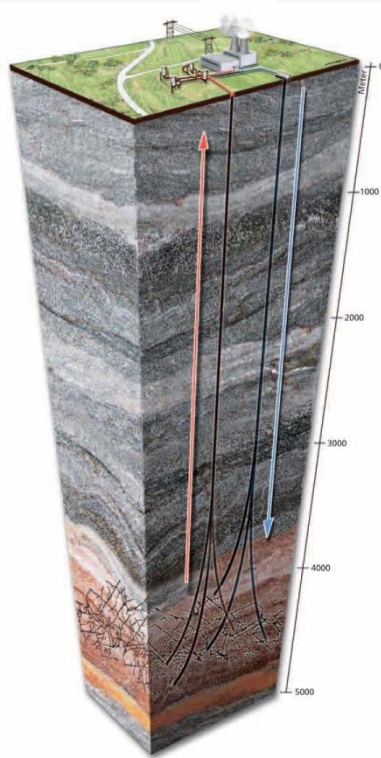


Enhanced Geothermal Systems - Madeira Island

Evaluation of the Geothermal Potential in MADEIRA ISLAND

Objective

- Find areas with potential for the occurrence of thermal systems
- System Modeling
- Model Quantification



LNEG - National Energy and Geology Laboratory
EEM - Empresa de Electricidade da Madeira



Madeira Island: Active Volcanism (with no historical eruptions)

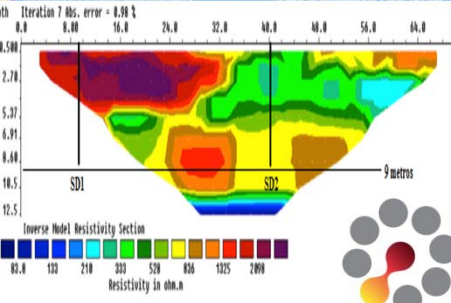
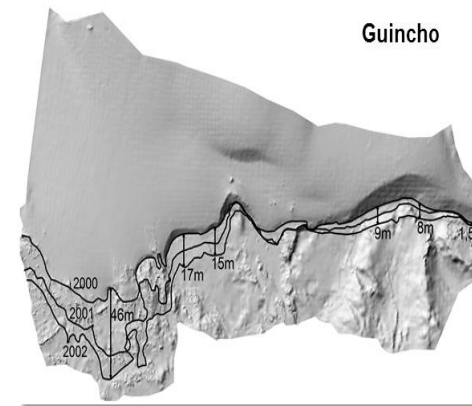
Methodology

- Geological mapping, structural geology and rock age determinations
- Geothermobarometry and geothermometry
- Elemental and isotopic analyses of waters and gases
- Magnetometry
- Ambient seismic noise tomography



Geological Risk

- **NEOTECTONIC – Data Base of active faults**
- **Erosion and stabilization in the coast line**
- **Floods and droughts - the regulatory role of aquifers**
- **CONTAMINATION**
 - **CRUDE project – ORGANIC CONTAMINATION**
 - **FREEZE project - fresh water discharges in marine ecosystems**



Drilling Technology

MECHANICAL DRILLING for geological and mining research

- Drilling: rotation with testimony sampling
- Drilling: percussion with sampling
- Surveys in destructive drilling





www.lneg.pt