





# Geological data for geothermal evaluation:

## Italy

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Italian National Research Council – Earth and Environment Department, Institute of Geosciences and Earth Resources

### Italy is a geothermal country

GE GE EC 7



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• Larderello and Travale/Radicondoli are two parts of the same field, covering a huge area of approximately 400 km<sup>2</sup>, producing super-heated steam at a pressure of 2 MPa and temperature in the range 150–270 °C. At Larderello, the exploited area is 250 km<sup>2</sup>, with 22 units for a total of 594 MW installed canacity: the

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Travale/Radicond MW (6 units). The (b) 6–7 MPa and terr

GE® ELFC

- Mount Amiata ar Piancastagnaio ar has been discove temperature arou capacity: one in E
- Projects for a furt coming years: nev a net increase of





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There is a growing interest for geothermal, testified by the high number of requests for exploration projects. Most of them are located in the high heat flow areas where hydrothermal systems are expected.

Proposed research projects:

- in the volcanic area of Campi Flegrei (Naples) to evaluate the possibility of supercritical fluid utilization.
- In southern Tyrrenian Sea, Marsili project, to exploit a huge volcanic complex



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The **inventory** of geothermal resources was performed by CNR, ENEA, ENEL and ENI, under Law No 896 of 1986. It resulted in maps and reports. The Geothermal Ranking was based on temperature and fluid availability

- A: areas where at least one aquifer, at depth < 3 km, has temperature > 150°C
- B: areas where at least one aquifer, at depth < 3 km, has temperature in the range 150 – 90 °C
- C: areas where at least one aquifer, at depth < 3 km, has temperature in the range 90 30 °C
- D: areas with only minor aquifers and, however, for depth < 3km, temperature < 150°C.



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3200 well data 590 spring data

Italian Geothermal DB webGIS Criteria for classification

E.g., criteria for magmatic or supercritical fluid favourability:

Active volcanic and magmatic systems E.g., criteria for geopressurized favourability:

- **Foreland areas**
- Large thickness

We need a better estimate









#### The Italian Geothermal database

The Italian National Geothermal Database was built in 1993 by the International Institute for Geothermal Research in Pisa (currently IGG, Institute of Geosciences and Earth Resources) of the National Research Council (C.N.R.) as completion of the Inventory of geothermal resources by CNR, ENEA, ENEL and ENI, under Law No 896 of 1986.

Data have been continuosly updated until 2001. During 2008, a software and data update have been implemented with the help and technical support of ENI Refining & Marketing, R & S managment and in collaboration with CEGL and UNMIG (Ufficio Nazionale Minerario per gli Idrocarburi e le Georisorse – National Office for Mining Hydrocarbons and Earth Resources) department of the National Economic Development Ministry, who guaranteed the access to a new dataset.

The upgrade has produced one of the most complete underground data repository at the national level.







The data contained in the database currently include:

- identification and location of wells and springs (available)
- temperature and depth (in progress)
- temperature gradient and heat flow
- litho-stratigraphic column of the wells (in progress)
- characteristics of the reservoir
- well production
- chemical, physical and isotopic data of water and gas
- well's technical profile
- correlation between vertical and deviated well
- permeability
- mineralizations in the well

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### **WEBMAPPING**



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- Features and high speed
- DB and geoDB interface
- Standard OGC (WMS-WFS-WCS)

### BDNG

#### Webmapping tools

#### Stratigraphic column





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# Supporting sustainable development of geothermal power production in the southern italian regions

GE Co-ELEC >

#### WP

Atlas of GS and UGS similar to those provided in other countries

ATLAS of conventional and unconventional geothermal resurces in the italian southern regions

EGS;

- Geopressurized systems;
- Magmatic systems;
- Supercritical fluid conditions

Realization of Data Centers



*Evaluation of environmental issues and ways of reduction* 

Information, promotion and training





### Evaluation of Geothermal Potential for the regiOni ConveRgenza



Regional and local assessment, pre-feasibility and fesibility studies, economic feasibility, cogeneration, hybrid plant proposals, information. GEGGELEC Supported by INTELLIGENT ENERGY EUROPE



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- basin layout and sedimentbasement interface depth (basin contour, sediment thickness
- outlinesand thickness of granitic-crystalline formations

E.g., Top of carbonatic platform, structural models and maps from various authors

Gravimetric and magnetic data









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Hydrogeological maps: shallow and deep hydrogeological units

They often lack deep characterization

ISPRA (shallow aquifer), universities (fragmented data), Regions, interregional bodies GEGGELEC Supported by INTELLIGENT ENERGY EUROPE



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On GeoThopica we can check the main hydrogeological units



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ISPRA (Italian National Institute for Environmental Protection and Research) has developed the ITHACA project (ITaly HAzard from CApable faults)



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Istituto Nazionale di Geofisica e Vulcanologia Database of Individual Seismogenic Sources DISS version 3

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Our experience for data sources: CNR ISPRA (geological survey) INGV (seismological and volcanological data) Universities Regions UNMIG

Other data: ENI (seismic profile, gravimetric and magnetic data)

### Thank you