

Descramble (verb) = "to convert or restore (a signal) to intelligible form"

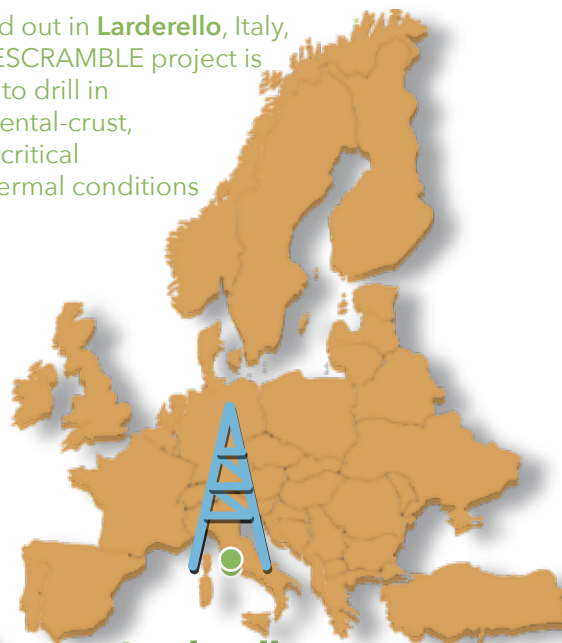
Oxford Dictionary

DESCRAMBLE's target: make deep, super-hot and possibly super-critical geothermal resources hosted in continental crust intelligible to science and industry, and provide all the necessary information for planning their use and market up-take.

DESCRAMBLE Project represents the initial phase of an innovation path: access to and characterization of the resource.

Pilot plant and full deployment will be the future steps.

Carried out in **Larderello**, Italy, the DESCRAMBLE project is going to drill in continental-crust, super-critical geothermal conditions



Larderello

The shallow depth of the chosen resource reduces costs for this test, whose results will open new market frontiers for exploiting similar resources at deeper depth

DESCRAMBLE

Drilling in dEep,
Super-CRITICAL AMBients of
continentaL Europe



Partners:

Enel Green Power, Italy
National Research Council CNR-IGG, Italy
RWTH Aachen University, Germany
Kiel University, Germany
TU Bergakademie Freiberg, Germany
SINTEF Petroleum, Norway
SINTEF Digital, 3S, Norway

Coordinator:

Dr. Ruggero Bertani,
Enel Green Power
Via Andrea Pisano 120
56122 Pisa - Italy
Tel.: 0039-050-6185650
ruggero.bertani@enel.com
www.descramble-h2020.eu



A project
under the funding program
HORIZON2020
Geothermal Energy
Ref n.ber 640573

1

Demonstrate safe drilling in super-hot, supercritical condition

by combining geothermal and oil&gas techniques, testing and choosing materials, equipments, components able to resist high temperature and pressure, aggressive conditions:

- unconventional cement, drilling fluid, casing materials, rock bits
- unconventional well control (Well Head, BOP, MPDS, cementing strategy, mud logging, cooling system)



Cement test



Rock bit

by monitoring micro-seismicity prior and during the drilling phase, using a high resolution seismic monitoring system (high density seismic network, high sensitivity, real-time control)



3

Improve in-situ characterization

by developing a special tool for super-high T and P measurements
by analysing fluid and rocks samples of deep, supercritical conditions

Tool prototype

- Max external Temperature 450°C
- Max external Pressure 450 bar
- Outer diameter 3"
- Tool length 260 cm
- Tool weight 50 kg
- T measurement accuracy < 5°C
- P measurement accuracy 0,5 bar



Fluid sampling

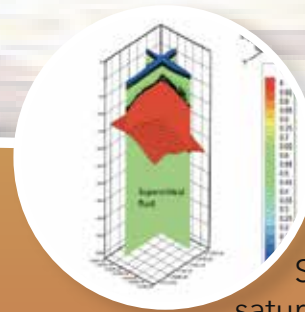


Improved seismic images

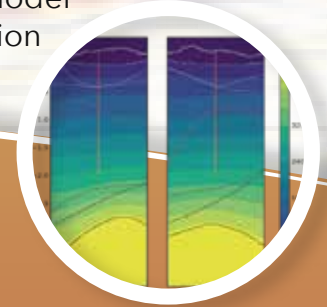
Reduce pre-drilling uncertainties

by adapting Real-time well control simulators from oil&gas to geothermal conditions
by improving 3D seismic images of drilling target
by characterizing deep physico-chemical conditions
by simulations of conventional and supercritical reservoir conditions

2



Simulation of gas saturation distribution



Local model simulation



Conceptual model