

DESCRAMBLE

Executive Summary

Project description:

The “**Drilling in dEep, Super-CRitical AMBient of continentaL Europe**” (DESCRAMBLE) project proposes to drill in continental-crust, super-critical geothermal conditions, and to test and demonstrate novel drilling techniques to control gas emissions, the aggressive environment and the high temperature/pressure expected from the deep fluids. The project will improve knowledge of deep chemical-physical conditions for predicting and controlling critical drilling conditions. An existing well in Larderello (Tuscany, Italy), Venelle_2, will be deepened from its present depth of 2.2 km down to 3-3.5 km. The DESCRAMBLE project will be partly supported by EU H2020 funds: **cost 15,2 M€, grant 6,7 M€**. The final purpose of the project is the chemical and thermo-physical characterization of the steam reservoir. The Venelle_2 well will not be converted in a production well.



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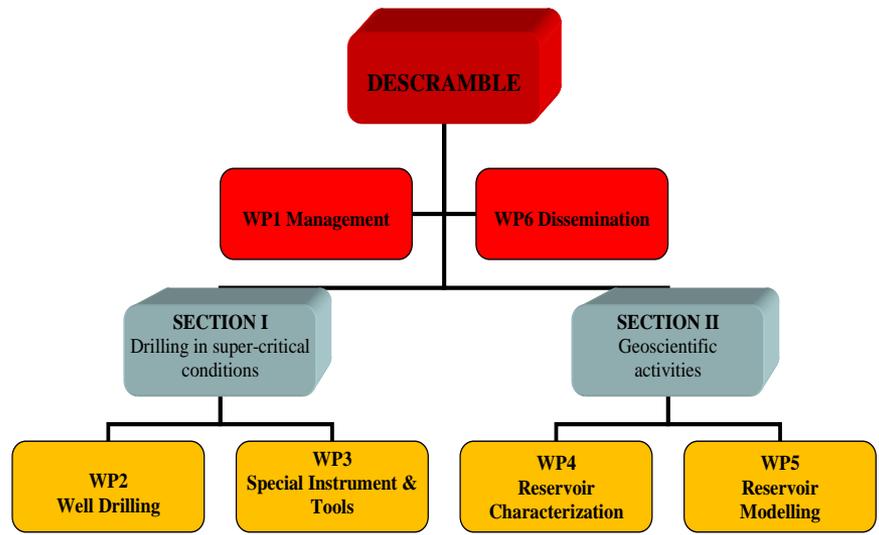
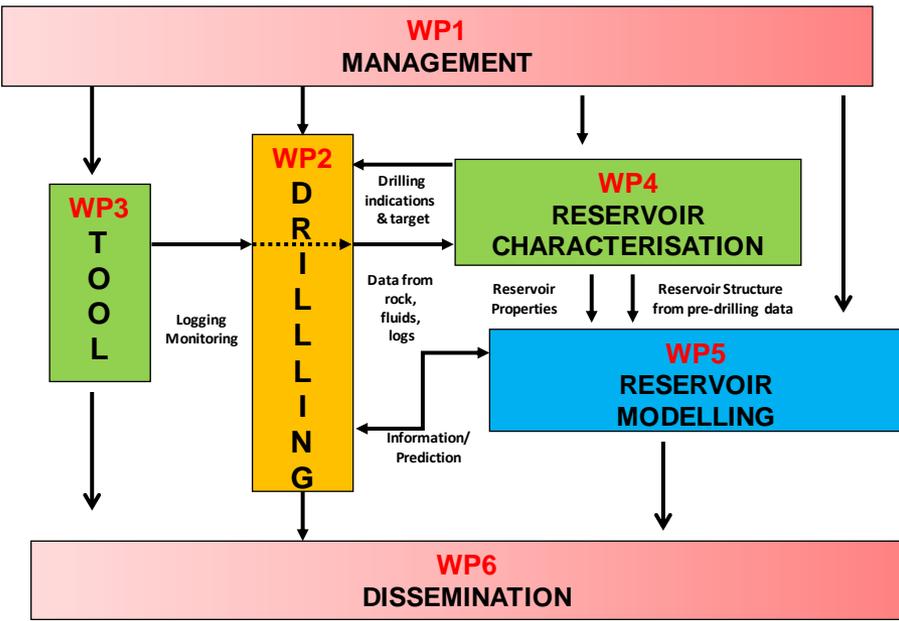
The DESCRAMBLE PROJECT is the first part of an innovation path in three phases:

- **PHASE I – R&D:** the activity partly financed by H2020 of deepening the Venelle_2 well, for testing new material and procedure for drilling and fluid handling in supercritical conditions (450°C and 250 bar). The probability of success of this phase is about 30%;
- **PHASE II - PILOT:** in case of success of PHASE I, a Pilot Plant of 40 MW could be realized, fed by a two supercritical wells, with possibility of grants from EU (as follow up of DESCRAMBLE), MIUR and Tuscan Region; the probability of success of this phase is about 80%.
- **PHASE III - Deployment:** after the R&D and Pilot phases, the supercritical plant could be replied in different locations in Italy and abroad, with a substantial cost reduction due to a learning curve effect.



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Work Breakdown Structure and Partners



Istituto di Geoscienze e Georisorse
Consiglio Nazionale delle Ricerche



SINTEF Group



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Innovative Aspects

HIGHLIGHT ON THE MOST INNOVATIVE ASPECTS

Applied research/demonstrations of industrial component
in an unconventional application:

- **Materials**: Bottom hole assembly components, Cementing process, Drilling fluids, Well materials (casing, well head, and cement)
- **Well design and control**: the research will optimize new procedures, explicitly utilizing synergies with oil and gas industry.
- **Predicting and controlling super-critical conditions**: the research will optimize new procedures, explicitly using synergies with oil and gas industry. Existing simulators will be extended to the super-critical regime.
- **Development of a new logging tool**: suitable for measurement of pressure and temperature at supercritical conditions.
- **Scientific research aspects**: Seismic characterization of the super critical region, Petrophysics and log interpretation, Geochemical monitoring and Petrology



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Benefits

HIGHLIGHT ON THE MOST IMPORTANT BENEFITS

- Increased power output per well (5-10 fold)
- Production of a higher value steam (higher P-T)
- Extending the resource base and lifetime of existing fields
- Knowledge of reservoir characteristics at greater depths
- Advancing techniques of UGR (Unconventional Geothermal Resources)
- Development of an environmentally benign resource
- Development of high-temp. instruments and drilling technology
- Application to high-temp. geothermal systems world wide
- Educational, industrial and economic spin offs

