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## Editorial – Volterra workshop



The ENGINE community in Volterra.

Workshop 2 of the ENGINE project “**Exploring high temperature reservoirs: new challenges for geothermal energy**” was hosted from 1<sup>st</sup> to 4<sup>th</sup> of April 2007 in the charming atmosphere of Tuscany, Italy. The workshop was held in the SIAF Campus, located just outside the main centre of Volterra. This was the most popular of the ENGINE workshops so far, and was attended by 77 participants from 16 countries and 5 continents. Forty ENGINE representatives from 14 partner organisations had the opportunity to share knowledge and debate with numerous external participants from 27 different organisations from industry and research centres. The goal of the workshop was to

review existing information regarding high temperature geothermal resources including new areas of research, such as supercritical fluids, and discuss improvements in exploration tools.

The workshop focused on current R&D needs for the geothermal exploration in high temperature conditions. Three sessions on this theme were defined (Signatures of high temperature condition; Modelling and reservoir simulation of high temperature systems; Supercritical fluids: a new frontier for geothermal energy). The priority of the specialised workshops was to compare experiences and promote discussion. Thus,

each session was introduced by two or three qualified speakers, followed by poster presentations, with plenty of time for discussion. The three sessions hosted a total of 8 presentations and 27 poster contributions. The Book of Abstracts as well as the files of both presentations and posters are already available on [ENGINE Workshop 2 Web Pages](#). The final contributions will be published in June 2007 on a CD-ROM.



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The workshop concluded on April 4 with an excursion to the Larderello geothermal area. Participants had the opportunity to see the direct application of geothermal fluids (district heating system of Pomarance, uses for greenhouses, and for cheese and ham/salami production), the drilling site of Monteverdi during operation, and the high-enthalpy power station of Valle Secolo. The visit was organized with the help of Pomarance Municipality and COSVIG, and lunch was offered by ENEL at their cafeteria in Larderello and. The Fondazione della Cassa di Risparmio di Volterra kindly supported the workshop and contributed to the good results of this interesting workshop.

In Workshop 1 heat, stress and pathways as well as the structural inventory of the subsurface were seen as the key elements for research needs in exploration. On this base, the Volterra workshop was driven by the concept of high temperature signatures. The importance of multidisciplinary studies and joint interpretation was stressed again, along with integrated modelling and simulation. Many examples were shown of integrated studies, but these clearly represent only the beginning of a long

research route, which should be enriched by research projects that are able to provide a complete data set to enable the characterization of the chemical and physical parameters of geothermal systems. The data set should be achieved both in natural systems (analogues) and artificial systems created for research aims. Research projects should be separate from development projects: the former should cover all possible fields, whereas the latter should be defined so as to obtain the lowest risks. The exploration and investigation of high temperature fields require the development of specific analysis and drilling technologies, nowadays only partially supported by international projects. Moreover, especially at high temperatures, the system dynamics is particularly important, and time represents a fundamental factor for the development, and therefore the comprehension, of processes. New experiments should be defined with this aim in mind.

Various discussions highlighted more general problems in the field geothermal energy: can we reach large amount of generating capacity? Since water, and the lack of it, has become a particular concern, shouldn't we start to consider other possible heat exchange fluids and/or mechanisms? The community of "explorers" should be ready to answer these and other important questions, such as imaging and assessing at high resolution temperature conditions of the subsurface, the presence, nature, status and dynamics of underground fluids, and the fluid-water interaction of different possible fluids. New techniques for acquisition, monitoring, and simulation are being defined at high temperature conditions.



Visiting a greenhouse heated by geothermal energy in the Larderello area.