Newsletter
ENhanced Geothermal Innovative Network for Europe co-ordination action

**N°7 – June 2007**

http://engine.brgm.fr



# 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 **1st to 4th 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.

Three sessions hosted
8 presentations and 27 posters.

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.

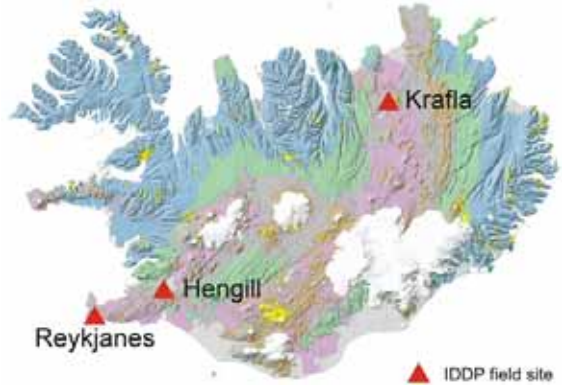
Various discussions highlighted more general problems in the field geothermal energy: can we reach large amount of generating capacity? Since water, and the lack of it, has become a particular concern, shouldn't we start to consider other possible heat exchange fluids and/or mechanisms? The community 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.

# Presentation of the HiTI project

The purpose of the EU funded project HiTI (High Temperature Instruments for super-critical geothermal reservoir characterisation and exploitation) is to allow crucial physical parameters to be evaluated in geothermal wells at temperatures and pressures up to and beyond the well fluid's supercritical state (T>374 °C and 22 MPa for pure water).

Our project kicked off in Potsdam at the ENGINE Mid-term conference in January 2007, where HiTI partners enjoyed the hospitality of ENGINE and GFZ organisers. HiTI participants are grateful for the opportunity given to present the project at an important arena and express their interest in further communication with ENGINE participants. The results of HiTI can hope-fully benefit the geothermal community.




Iceland Deep Drilling Project (IDDP) sites.

HiTI has ties with the Iceland Deep Drilling Project (IDDP), in which 4-5 km deep wells will be drilled in geothermal regions in Iceland with the long-term prospect of significantly increasing the available power output from each well, compared to output power from conventional 2-3 km deep wells. The majority of HiTI's budget is spent on the design and assembly of instruments capable of tolerating the extreme environment expected in an IDDP well. The measured *in situ* parameters in the project will be temperature, pressure, flow, water conductivity, casing collar location, resistivity (dual laterolog), natural gamma rays, televiewer images (stress and fracturing), Na/Li temperature ratio and organic tracers.

Direct temperature will be measured using digital, analogue and fiber optic techniques, pushing the temperature tolerance limit of the different evaluation methods.

Geothermal site and plant at Krafla (Iceland).

Resistivity measurements will be performed on sampled core under controlled tempera-tures and pressures, reaching well beyond the water supercritical state (>600 °C and 2000 bar).

Partners in HiTI are:

ISOR (Iceland), CNRS Montpellier (France), BRGM (France), Calidus Engineering Ltd. (U.K.), ALT (Luxembourg), GFZ (Germany), Oxford Applied Technology (U.K.) and CRES (Greece).

*Further information on the project's website*: http://hiti-fp6.eu

The HiTI project was presented at the ENGINE workshop 2 in Volterra.
Probing of high temperature geothermal reservoirs from electrical methods: HiTI EC project and the IDDP, Pezard et al.

# Next ENGINE meetings

## *Reykjavik, workshop 4, 2-5/07/2007*

**Deadline for registration: 15/06/2007**

The ENGINE workshop 4 "Drilling cost effectiveness and feasibility of high-temperature drilling" will be held at ISOR, Grensasvegur 9, Reykjavik, Iceland, July 2 – 5.

Reykjavik.

The workshop is planned with presentations of invited speakers on specific topics and short poster presentations (5 min) and discussions.

The aim of the workshop is to bring together experts to discuss drilling concepts for EGS and high-temperature systems. The workshop is a chance to report on the state of the art and identify gaps and opportunities for technical development.

The workshop will close with a day tour on July 4 to a new geothermal power plant and drill site at Hellisheidi including the Golden Circle Tour. On July 5 an optional day-trip is offered by plane to the North to visit a Kalina power plant at Húsavík, Krafla power plant and the Mývatn area known for its striking geology, birdlife and abundant geothermal activity.

Modern geothermal drilling rig.

- Registration for the workshop is mandatory, deadline June 15, 2007. The online registration form is provided on the workshop website
- Deadline for abstract submission: June 10, 2007. Please use the online abstract submission form.
- Further information: http://engine.brgm.fr following the link Conferences & workshops.
- The flyer of the Reykjavik workshop is on the next pages.

## *Athens, workshop 6, 13-14/09/2007*

ENGINE workshop 6 on "Increasing policy makers' awareness and public acceptance" will be held in Athens, Greece.
The aim of the workshop is to bring together experts to exchange ideas on policy makers awareness and public acceptance on geothermal projects that face strong opposition nowadays from politicians, neighbouring communities or environmental pressure groups. The focus will be on:

a. Case studies on policy makers' awareness and public acceptance.
b. Measures towards the increase of knowledge and flow of information in order to increase the public perception and acceptance.
c. Environmental impact assessment and public acceptance.
d. Miscommunication between companies and public.
e. Non-technical barriers and possible ways to overcome them.

We invite you to submit an abstract on the state of the art concerning policy makers' awareness and public acceptance of geothermal projects. The deadline of abstract submission is on 13th July 2007 and the deadline of registration is on 13th August 2007. More information will be available on the workshop 6 Web pages.

# ENGINE

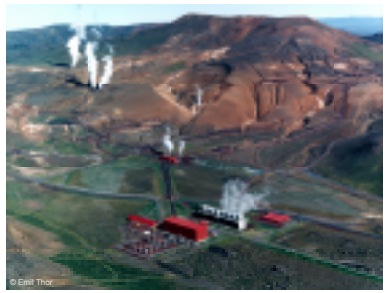
ENhanced Geothermal Innovative Network for Europe
http://engine.brgm.fr

Workshop 4

## *Drilling cost effectiveness and feasibility of high-temperature drilling*

July 2 - 5, 2007
Reykjavik, Iceland




## BACKGROUND

The workshop is organised within the framework of the EU ENGINE Coordination Action.

## AIM OF THE WORKSHOP

The aim of the workshop is to bring together experts to discuss drilling concepts for EGS and high-temperature systems. Ever deeper geothermal wells are projected and innovative ideas in drilling effectiveness are required. Now new highly automated rigs are manufactured in Europe and advances are made in high-temperature logging tools. This is a chance to report on the state of the art and identify gaps and opportunities for technical development.

It is intended to report these findings in the ENGINE project. This ENGINE workshop 4 is thus an important venue for presentations of state-of-the-art concepts. Workshops devoted exclusively to geothermal drilling are few and thus institutions with geothermal interests and companies are urged to attend.

The programme includes time for short “commercials” and poster presentations where companies can highlight the technology they have on offer or are developing.

## PLACE

Iceland GeoSurvey, (ISOR)
Grensasvegur 9
108 Reykjavik, Iceland
Room: Vidgemlir, 1 st floor

## REGISTRATION AND ABSTRACT SUBMISSION

For registration please use online registration form at:

http://conferences-engine.brgm.fr/conferenceDisplay.py?confId=5

Registration deadline:
June 15, 2007
Abstract submission deadline:
June 10, 2007

## CONTACT

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# PRELIMINARY PROGRAMME

## Monday, July 2, 2007 - Session I:

Case histories of EGS and high-temperature drilling

9:00-13:00

- J. Baumgärtner (Bestec): Drilling EGS wells at Soulz
- W. Brandt (GFZ): Drilling at Groß Schönebeck
- S. Thorhallsson (ISOR): Drilling plans of the Iceland Deep Drilling Project (IDDP)
- M. Monterrosa (LaGeo): Geothermal drilling experiences in El Salvador

Poster presentation
Discussion

13:00 - 14:00 Lunch

14:00 - 18:00 - Session II:

Innovative technology and drilling effectiveness

- E. Huenges (GFZ): GFZInnovaRig
- Th. Gíslason (Iceland Drilling Company): Geothermal drilling with modern highly automated rigs - a drilling contractor‘s perspective
- Á. Gunnarsson (Iceland Geothermal Engineering): Lineshaft pumps for geothermal wells
- S. Berli (Foralith): Efficient drilling and the utilization of hydraulic hammer
- K. Ingason (VGK-Hönnun): Relative cost of drilling directional vs. vertical for normal and large diameter wells

Poster presentation
Discussion

20:00 Dinner

## Tuseday, July 3, 2007 - Session III:

Well design and cementing

9:00-13:00

- A. Sperber (IDEAS): Casing program
- M. Matthíasson (VGK-Hönnun): Iceland Deep Drilling Project (IDDP) casing design for extremely high temperatures
- W. Brandt (GFZ): Top-down cementing of geothermal wells
- S. Birgisson (Iceland Drilling Company): Cementing of geothermal wells in Iceland

Poster presentation
Discussion

13:00 - 14:00 Lunch

14:00 - 18:00 - Session IV:

Reservoir assessment, stimulation, testing and logging

- M. Monterrosa (LaGeo): Reservoir engineering in two geothermal fields in El Salvador
- Z. Sarmiento (FEDCO): Experiences in the Philippines
- T. Kohl (Geowatt): The PT borehole simulator HEX-B
- T. Schulte (GFZ): Conventional logging
- R. Ásmundsson (ISOR): High temperature logging

Poster presentation
Discussion

## Wednesday, July 4, 2007

Field trip

9:00 - 18:00

Visit to the a new geothermal power plant and drill site at Hellisheidi and the Golden Circle Tour.

- Power plant, Hellisheidi
- Geothermal area, Geysir
- Gullfoss waterfall
- National Park, Thingvellir

## Thursday, July 5, 2007

Optional field trip

7:30 - 22:00

Optional day-trip by plane to the North of Iceland to visit a Kalina power plant at Húsavík and the Mývatn area known for its striking geology, birdlife and abundant geothermal activity.

*Please notice this field trip is optional and at participant expense. Total price: 24.000 ISK (approx. 270 €). The cost include: Flight , airport tax, transportation and guide from ISOR on tour from Akureyri, lunch at Lake Mývatn.*
*Information and booking at the webpage:*
*http://conferences-engine.brgm.fr/conferenceTimeTable.py?confId=5*

*Flight seats cannot be guaranteed after June 1st. After that date they are on a request basis.*