

WP2: Objectives, Information & Dissemination System

ENGINE - Geothermal Lighthouse Projects in Europe

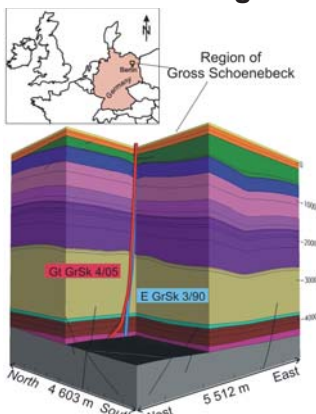
by
 Anders Mathiesen, GEUS (anm@geus.dk)
 Philippe Calcagno, BRGM (p.calcagno@brgm.fr)

One of the goals within the ENGINE project was, as part of the WP2, to locate and classify main Geothermal Lighthouse Projects, related to ENGINE topics and significant on a European scale. Based on questionnaires guided by a simple structure and relevant keywords and divided into two parts (A & B):

A. Summary information

B. Additional information as 4 categories

Example:
 Test site and Geological Model



Project Name:
Project Institute/Company Leader:
Contact Person:
Web-site:
Country:
Location:

Type(s) of resource [High/Low Enthalpy / EGS]:
Main on-site operators [Drilling, Stimulation, Monitoring, Power plant etc.]:
Number of wells [w. Total Depth or well]:
Type of wells [Exploration, Production, Injection]:
Well configuration [Single well, Doublet, Triple]:
Distance between well at Depth [Horiz. Dist at Depth]:
Temperature at total depth:
Combination with other energy sources [Gas, Waste, Biomass etc.]:

Potential of the geothermal resource [T/yr at Date]:
Average flow rate [kg/s at Date (if expected)]:

Main production [Heat or Power]:
Installed/Expected capacity [MW/e or MWt at Date (if expected)]:
Running/Expected capacity [MW/time at Date (if expected)]:

Co-generated production [Heat or Power]:
Installed/Expected capacity [MW/e or MWt at Date (if expected)]:
Running/Expected capacity [MW/time at Date (if expected)]:

Short description of Exploration History (Limit this section; no more than 200 words):

- Possible keywords (non-exhaustive list):
- Objective of project
 - Important dates
 - Main geological context [stratigraphy, sedimentary formations, volcanism, granite intrusions, faults, graben etc.]
 - Expected CO₂ emission saving
 - Project funding [state, communities, private etc.]
 - Distribution network

Reservoir Characteristics (Limit this section; no more than 200 words):

- Possible keywords (non-exhaustive list):
- Type of reservoir [fractured, porous or both]
 - Hosted lithology/rock/mineralogy/fluids [composition]
 - Fracture system
 - Stress field
 - Temperature range or temperature profile
 - Main reservoir characteristics [porosity, (natural) permeability etc.]
 - Occurrence of natural brines
 - Stimulation types [hydraulic, thermal, chemical]
 - Wells characteristics [injectivity, productivity etc.]
 - Connectivity between wells
 - Storage capacity

Exploitation (Limit this section; no more than 200 words):

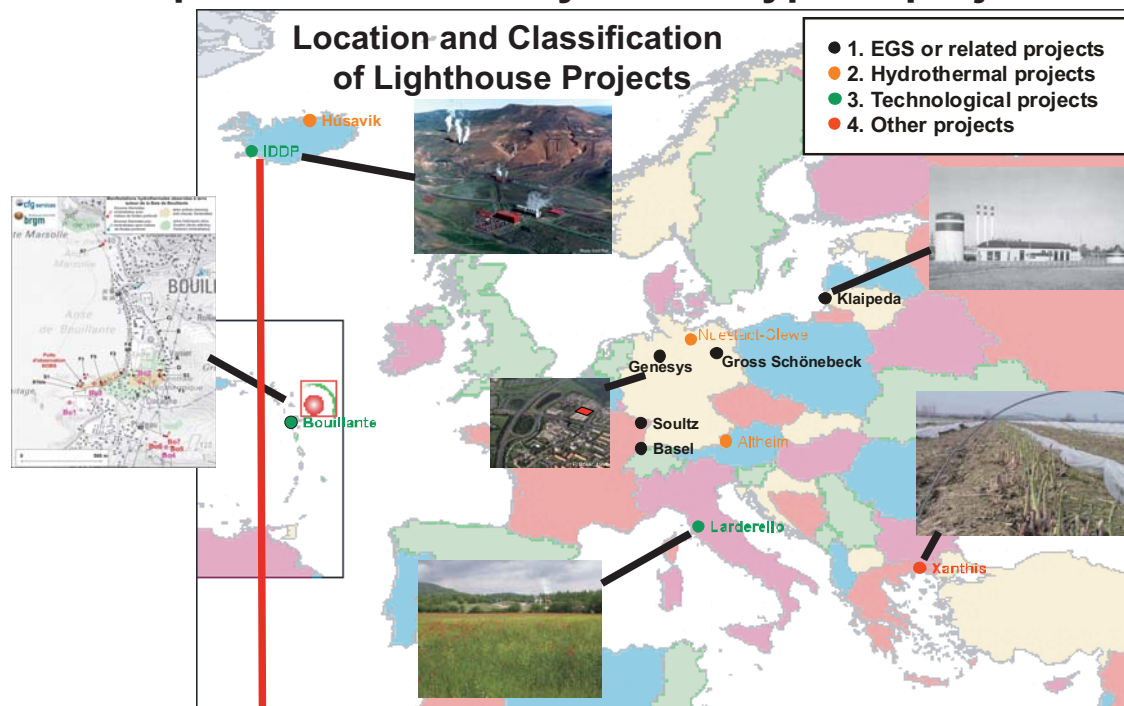
- Possible keywords (non-exhaustive list):
- Type of exploitation/power plant [direct, binary or combined cycle]
 - Type of binary cycle [ORC, Kalina cycle etc.]
 - Nature of working fluid
 - Cooling system [water, air]
 - Injection fluid [water, salty water etc.]
 - Annual production [GWh, or GWh, at Date (if expected)]
 - Seasonal production
 - Capacity factor (%)
 - Need for special tools [pumps, turbine etc.]
 - Development/improvement of methods [chemical fracturing, new tracers, seismic etc.]
 - Monitoring and optimising of field/area using computer models
 - Assessment of environmental impact

ENGINE partners involved in the Project:

- Use list of partners from ENGINE Web-site <http://engine.brgm.fr/partners.asp>

Main References (no more than 5 references):

it was possible to classify 4 main type of projects:

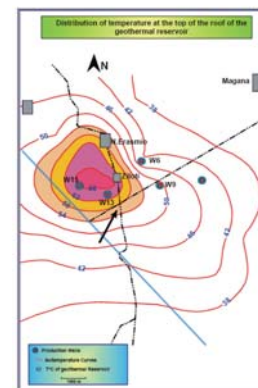


.....and suitable for public display on the ENGINE Web-site:

Project name: The Iceland Deep Drilling Project (IDDP)
Project leader: Iceland Energy Consortium
Contact person: G. O. Fridleifsson, ISOR
Country: Iceland
Location: Iceland (Reykjanes, Krafla, Hengill)
Types of resource: High Enthalpy
Main on-site operators: Landsvirkjun
Number of wells: 34 (~2200 m)
Type of wells: Production
Well configuration: Single well
Distance between well at Depth: -
Temperature at total depth: 340°C
Combination with other energy sources: -
Geothermal co-operation: Electricity
Geothermal potential: At least 100 MWe proven.
Installed capacity: 60 MWe 2008
Running capacity: 60 MWe 2008

Further Information (.PDF)

Example:
 Maps with data and Information



Objective of project: To improve the efficiency and economics of geothermal energy production by exploring for supercritical hydrothermal fluids as a possible energy source.
Important dates: Deep drilling in 2008
Main geological context: Hyaloclastites and basaltic lava sequences down to ~1 km and intrusive complex below that to >2 km. Cooling magma chamber below 4-5 km.
Project funding: Iceland Energy Consortium, ICDP, US-NSF.
Distribution network: ICDP, http://www.icdp-online.de/content/icdp/front_content.php

1. Albertsson, A., Bjarnason, J.O., Gunnarsson, T., Ballus C. and Ingason, K., 2003. Part III : Fluid Handling and Evaluation, 33 p. In: Iceland Deep Drilling Project, Feasibility Report, ed. G.O.Fridleifsson. Orkustofnun Report OS-2003-007.
2. Fridleifsson, G.O., Albertsson, A. (2000). Deep geothermal drilling at Reykjanes Ridge: opportunity for an international collaboration. In: *Proceedings of the World Geothermal Congress, Japan*, pp.3701-3706.
3. Fridleifsson, G. O., Arnmannsson, H., Arnason, K., Bjarnason, I.Th., and Gislason, G., 2003 a. Part I : Geosciences and Site Selection. In: *Iceland Deep Drilling Project, Feasibility Report*, ed. G.O.Fridleifsson. Orkustofnun Report OS-2003-007.

Other geothermal projects e.g. in Poland, Denmark, Slovakia and Greece are mainly dedicated for heating purposes and was at first not relevant for the ENGINE project. In the future, it could be informative to incorporate these projects.