Research and Development - Strategy of the European Energy Research Alliance (EERA) Joint Programme on Geothermal Energy

David Bruhn[1], Ernst Huenges[1], Isabella Nardini[2].

[1] GFZ German Research Centre for Geosciences

International Centre for Geothermal Research, Potsdam (GE)

[2] CNR - Institute of Geosciences and Earth Resources, Pisa (IT)

huenges@gfz-potsdam.de

Keywords: Geothermal energy, EGS, research strategy, European alliance

INTRODUCTION

A total of 400 person years/year, for an equivalent budget of more than € 30 MILLION/year, from 30 participants from 12 European countries is working with different roles and responsibilities for the JPGE's ongoing and foreseen research activities and ready to share research infrastructure such as laboratories and computer facilities among the participants.

BACKGROUND

Geothermal energy is a non-carbon-based renewable energy source, able to provide base load power for electricity and heat generation in many countries around the world. In continental Europe the geothermal potential is estimated to be over 50.000 MW, but only in Italy, Iceland, and Portugal it has been harnessed for the generation of electricity (over 1.400 MW installed capacity). For an increase of the contribution of geothermal energy to the global power production, research needs to support some major goals:

- significantly enhancing the production from already identified and utilized resources
- exploring at large scale new untapped deep seated (up to 6 km) hydrothermal systems
- making Engineered Geothermal Systems (EGS) ready for large scale deployment
- accessing "high potential" resources such as Supercritical fluids and Magmatic Systems.

Beside the technological challenges other aspects of relevance for the further development of geothermal energy require to be addressed with innovative approaches and tools to:

- improve the risk assessment and management for a reliable evaluation of the technical, environmental and economic sustainability of the projects
- secure the social acceptance of geothermal projects by ensuring that potential site and technology specific side effects are typically relatively minor compared to the benefits
- provide the guidelines to the Regulatory Authorities and Policy Makers for sustainable development of geothermal initiatives

STRUCTURE (SUB PROGRAMMES):

- **Resource Assessment**
  This subprogramme is focused on the development of innovative approaches and cost-effective exploration technologies to be applied in several prospective areas in Europe for the accurate assessment of the geothermal potential stored at depth up to 6000 m, the definition of the drilling targets, the definition of thermal and stress conditions favorable to produce an EGS and the forecast of the reservoir performance and resource sustainability. The subprogramme started from the knowledge gained through the past 50 years of exploration for hydrocarbon, geothermal and mineral resources, and several R&D program such as ENGINE and IGET.
- **Accessing and Engineering of the Reservoir**
  Drilling represents the single most expensive step in the development of a geothermal site. Improvement of drilling, well completion technologies, and reservoir engineering are some of the key issues to be addressed in the JPGE.

- **Process Engineering and Design of power systems**
  Process Engineering and Design of power systems; the efficient production of heat, chill and electricity from geothermal energy plays a major role for the economic sustainability of any geothermal power project. To enhance the net efficiency of geothermal power plants all components and aspects have to be considered. This subprogramme addresses improvements in heat transfer from geothermal fluid to the energy conversion system and the development of new, more efficient binary power systems. Also cross-sectional tasks as geothermal water chemistry, corrosion etc. will be taken into account by the development of new materials at lower cost. These developments will be integrated in new power loop components.

- **Operation and Management of Geothermal Systems**
  The sustainable use of geothermal energy requires a thorough understanding of the processes occurring during the operation of the system. Reliable reservoir models, intelligent design of surface installations, careful selection of system components, operation methods and maintenance schemes are the most important factors for success.

- **Sustainability, Environment and Regulatory Framework**
  This sub-programme addresses the issues related to the financial and environmental performance of geothermal power plants, and the social acceptability by local stakeholders, which vary widely according to the type of geothermal system and end of pipe technologies, local features and communication activity.

PARTICIPANTS/ASSOCIATES:

BRGM (FR), ENERGEA(IT), CNR (IT), CNRS (FR), CRES (GR), ETH-Z (CH), FZK-KIT (DE), ISES (NL), ISOR (IS), LIAG (DE), TNO (NL), BGS (UK), CHYN-UNINE (CH), ENEA (IT), GFZ (DE), INGV (IT), LNEG (PT), GGE-E.ON RWTH (DE), VITO (BE), IFE (N), TDU (D), POLIMI (IT), UNITO (IT), UNITS (IT), UNIBA (IT), GZB (DE), TÜBITAK (TR), OGS (IT), IRIS (N), POLITO (IT).

http://www.eera-set.eu/index.php?index=22