

Leading a Revolution in Deep Geothermal Innovation

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A European Technology and Innovation platform (ETIP) working on the development of deep geothermal energy in Europe has recently been established in the framework of the European Strategic Energy Technology Plan (SET-Plan). Made up of stakeholders from industry, research and policy, the overarching objective of the new Deep Geothermal ETIP is to identify the ways in which new technologies and methods will shape the future of geothermal and how they can be cost-effectively brought to market, allowing more citizens to benefit from this renewable, stable resource.

THE STATUS OF DEEP GEOTHERMAL

Geothermal energy is a valuable and local source of energy that can cost-effectively provide base-load/dispatchable electricity, heat or a combination of both. It has great potential as a renewable source, not only in Europe but also globally, and in particular in some developing countries. Its potential is inexhaustible in human terms, comparable to that of the sun.

Deep geothermal energy, which can be directly used as heat or converted into electricity, is nowadays directly used, depending on its temperature, in a number of sectors: from bathing and swimming to industry, agriculture and district heating, this latter being the most promising sector for geothermal heat. In Europe there are 257 geothermal district heating systems, with total installed capacity of 4.6 GWth (EGEC, Market Report 2015).

According to the EGEC Market Report Update, in 2015 the installed capacity for geothermal electricity generation

in Europe amounts to around 2.2 GWe, of which 0.95 GWe is in the EU, and it is expected to reach 3.5 GWe in 2018, mainly thanks to the very promising Turkish market.

The relevant resources, though, are far from being fully developed.

Recent modelling results by the JRC-EU-TIMES model predict geothermal power production of 540 TWh in 2050 under a long term decarbonisation scenario. This would mean that geothermal power could provide 12.5 % of the EU electricity demand while exploiting about 20 % of the available geothermal technical potential. This market share might be increased significantly if cost reductions associated with drilling will be realised.

Geothermal energy has an excellent potential in Europe, and in a number of NREAP (National Renewable Energy Action Plan) there are ambitious, yet far to be reached, targets for it. Recent technological developments have made it possible to cost-effectively produce electricity from geothermal energy with fluids at lower temperatures and there is an increasing awareness of the potential of geothermal heat, but in order to allow geothermal energy to fully meet its potential in the renewable energy mix it is necessary to tackle some issues to improve performance and reduce costs, and make widespread implementation possible.

DEEP GEOTHERMAL ETIP

The European Commission's Energy Union strategy, adopted in February 2015, dedicates one of its five dimensions to research, innovation and competitiveness. Under the integrated SET-Plan, which defines the

EU's Research and Innovation strategy for coming years, the European Commission has recognised the European Technology and Innovation Platforms (ETIPs) as an important tool to strengthen cooperation with Stakeholders.

It is in this framework that the geothermal sector created, in March 2016, a European Technology and Innovation Platform on Deep Geothermal, which was then officially recognised by the European Commission, DG RTD, as an ETIP in July 2016.

The Deep Geothermal ETIP is an open stakeholder group, including representatives from industry, academia, research centres, and sectoral associations, covering the entire deep geothermal energy exploration, production and utilisation value chain. Its mission is to provide a framework for stakeholders to define and implement an innovation strategy to increase the use of geothermal and to foster the growth and the market uptake of the relevant European industries.

The purpose of the platform is to enable deep geothermal technology, and in particular Enhanced Geothermal Systems (EGS), to proliferate and move from the current European R&D and pilot-sites to other European countries and different geological situations. The primary objective is overall cost reduction, including social, environmental and technological costs.

These goals are addressed by the strategic targets of the Declaration of Intent on Deep Geothermal Energy, adopted in September 2016, which are:

The Rittershoffen project (Alsace, France) is an EGS project supplying heat to a local starch producer and biorefinery.



1. Increase reservoir performance¹⁴ resulting in power demand of reservoir pumps to below 10% of gross energy generation and in sustainable yield predicted for at least 30 years by 2030;
2. Improve the overall conversion efficiency, including bottoming cycle, of geothermal installations at different thermodynamic conditions by 10% in 2030 and 20% in 2050;
3. Reduce production costs of geothermal energy (including from unconventional resources, EGS, and/or from hybrid solutions which couple geothermal with other renewable energy sources) below 10 €/kWh for electricity and 5
4. Reduce the exploration costs by 25% in 2025, and by 50% in 2050 compared to 2015;
5. Reduce the unit cost of drilling (€/MWh) by 15% in 2020, 30% in 2030 and by 50% in 2050 compared to 2015;
6. Demonstrate the technical and economic feasibility of responding to commands from a grid operator, at any time, to increase or decrease output ramp up and down from 60% - 110% of nominal power.

€/kWh for heat by 2025¹⁵;

Five working groups are operating to reach the objectives, focusing on:

exploration; deep drilling; reservoir performance, production and well field development, including reservoir, operation flexibility, corrosion and scaling; surface equipment; non-technical and environmental issues.

Concrete steps can be taken to bring geothermal technologies to full commercial scale and to allow for widespread use of geothermal, and the Deep Geothermal ETIP and its working groups are working towards the goal. ●

Interested parties are welcome to join the platform by visiting www.geoelec.eu/etip-dg/.