**Geo-Drill: A Holistic Drilling Technology For Geothermal Systems**

By Geo-Drill Consortium

**Geothermal drilling** is by far the major element of cost in any geothermal project. This is particularly true for deep Engineered Geothermal Systems (EGS) in hot dry rocks where the costs increase due to increased drilling distances, tripping times and harsher environments. According to an estimate, drillings costs alone can contribute to about 30-70% of the overall project development expenditure for a deep geothermal project — costs associated with use of expensive drilling rigs, drilling times including time spent to tackle drilling wear and trouble-shooting.

Project Geo-Drill is a collaborative project with an aim to develop drilling technologies that have the potential to reduce the cost of drilling. “Our aim is to develop holistic drilling technologies that have the potential to drastically reduce the cost of drilling to large depths, 5km or more and at temperatures as high as 250°C”, says Geo-Drill consortium. The project kicked-off on 3rd April with a consortium meeting hosted by TWI Ltd. and will run for a period of 42 months.

**Geo-Drill Concept and Technologies**

The primary concept of Geo-Drill is based on three technology pillars: a) reduced drilling cost through hydraulic Down-the-hole (DTH) fluid/mud hammer; b) advanced drill monitoring through low-cost and robust 3D printed sensors; c) improved component life through advanced materials and coatings. In the Geo-Drill project, the strength of these technologies are combined to meet the unified objective of developing novel drilling technologies.
Drill String technologies that will significantly reduce the cost of deep geothermal drilling. Additionally, the technology pillars are over-arched with a knowledge-based system (KBS) coupled to cost- and environment modelling and a decision support system (DSS) — A suite of design DSS, informed with the relevant information from flow assurance & drill string physics simulators and KBS, to produce reliable lifecycle estimates for performance, operational costs, environmental impacts and risks.

**Geo-Drill Impacts:**

Geo-Drill aims to develop economic and efficient methods, materials and designs for high performance drilling in deep and high temperature geothermal drilling environments. The new fluidic hammer, drill monitoring system and improved longer lasting drilling components developed through the project are intended to improve the rate of penetration, lifetime and reliability compared to existing commercial technologies. As such, Geo-Drill will enhance the growth of geothermal energy by significantly reducing geothermal power plant capital expenditure (CAPEX) spent on drilling while also significantly reducing the environmental impact during installation.

**The Consortium:**

The Geo-Drill consortium is of a complementary nature including product developers and end-user/geothermal drilling operator ID, engineering firm, universities and research institutes. These include TWI Limited (Coordinator, UK), Hochschule Bochum (Germany), Geolorn Limited (UK), Jardboranir HF (Iceland), Precision Varionic International Limited (UK), Technovative Solutions Ltd (UK), Flowphys AS (Norway), Commissariat A. L. Energie Atomique et Aux Energies Alternatives (France), Gerosion EHF (Iceland), Haskoli Islands (Iceland), Rina Consulting – Centro Sviluppo Materiali SPA (Italy) and Graphenea SA (Spain).

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