



Novel Directional Steel Shot Drilling Technology for Short-Radius Multilaterals – Field Application and Commercial Impact

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Reliable delivery of economic well performance of geothermal projects is affected to a high degree by uncertain reservoir quality. Construction of multilateral wells is well known as an effective concept to overcome the challenges of reservoir heterogeneity or low permeability by increasing the reservoir contact. However, the drilling costs for these structures are currently very high and multilateral well construction with standard rotary steerable systems is complex. Canopus' directional steel shot drilling system (DSSD) has the potential to enable the construction of short-radius multilaterals at rates attractive for geothermal applications.

As part of the European GEOTHERMICA project 'DEPLOI the HEAT', the operational performance and economic impact of Canopus' DSSD system will be investigated. Full-scale tests at TNO's Rijswijk Centre for Sustainable Geo-Energy (RCSG) and a field trial at the Hagerbach underground test facility (VSH) are planned for the first project year. The RCSG drilling rig enables full factory acceptance testing (FAT) of the drilling assembly before the trial at the VSH site is executed. The geology at the VSH site reflects conditions of typical mid-depth fractured limestone reservoirs in Switzerland and elsewhere. At VSH, a complete set of operational parameters and system longevity will be tested with a full-scale trial to prepare for live well deployment.

Further, a techno-economic assessment of multilateral structures drilled with Canopus' DSSD system will highlight the potential for increasing or safe-guarding well productivity and economically de-risking geothermal projects. Several operators are involved in this project and the techno-economic assessment of the drilling technology will be based on several site-specific data sets provided by them. Stochastic modeling approaches will be implemented to generate an ensemble of equally probable realizations of permeable structures in the subsurface. Then, the performance and costs of different well geometries and multilateral configurations in different subsurface model realizations will be evaluated and compared.

The current status of this project will be presented with a focus on the factory acceptance testing at TNO, the VSH trial preparations and the workflow developed for the techno-economic

assessment of this innovative multilateral drilling technology.