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Baden Arena Kongress 1 – Tiefe Geothermie

Thursday, 29 February 2024, 11.20 am
Baden Arena Congress 1 – Deep Geothermal Energy



Development of geothermal energy in areas with low transmissivity and/or in areas with a high density of operations. Well architectures to maximise heat extraction

Erschließung der geothermischen Energie in Gebieten mit geringer Durchlässigkeit und/oder in Gebieten mit hoher Betriebsdichte. Bohrlocharchitekturen zur Maximierung der Wärmeausbeute

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Energy transition policies implemented recently in France acted as a strong stimulus by targeting a quasi two fold increase in heat production from deep seated geothermal reservoirs.

Clearly the message means that the Dogger (Mid Jurassic) carbonate rocks, a dependable hot water resource of regional extent supplying, via 50 doublets and grids, ca 1,500 GWhth/year to the Paris suburban areas, the world's largest Geothermal District Heating operated to date, will have its capacity doubled by the scheduled 30 new doublets, each rated 50,000 MWhth/year.

The ambitious goals required appropriate well designs taking advantage of the multilayered reservoir structure, a distinctive attribute of a number of sedimentary settings securing both thermal longevity along well to reservoir exposure. Another concern addressed the reclamation of moderately to poorly productive areas, which otherwise would have remained unchallenged.

The so-called subhorizontal (SH) well concept was initiated on the Cachan, moderately performant (15 Dm transmissivity) site, South of Paris, with a view to replace two, 33 year old doublets, cumulating 350 m³/h nominal production. The philosophy behind the concept aimed at intersecting via a step wise, en echelon type, trajectory, the layering sequence inferred from either temperature/flowmeter (PLT) logs on offset wells or straightforwardly from direct drilling assessment.

Trajectories both landed at top reservoir at 85 to 88° angles easing the geosteering process securing low DLS's by avoiding sharp angles. RSS(Rotary Steerable System), MWD, LWD, PDC bits equipped the BHA (Bottom Hole Assembly) complemented by XRF/XRD analysis performed on cuttings, allowing to anticipate the bit position ahead from LWD information. The first geothermal SHW doublet awarded as a world premiere achieved 450 m³/h production and operates safely 4 years after completion of two 1 km long drains.

The concept replicated in 2022 on a poorly productive (10 Dm transmissivity) site achieved similar performances thanks to a modified Ecoscope/Periscope HD (SLB™) geosteering BHA, confirming the pilot hole strategy as non essential.

Typical programmes and workflows along architecture modelling are documented. Technological and economic issues are also discussed.