Freitag, 1. März 2024, 9.10 Uhr
Baden Arena Kongress 2 – Oberflächennahe Geothermie

Friday, 1 March 2024, 9.10 pm
Baden Arena Congress 2 – Shallow Geothermal Energy

Real-Time Data Simulator for the Qualification of DAS Passive Seismic Geothermal Monitoring Systems

Echtzeit-Datensimulator für die Qualifizierung von DAS Passive Seismic Geothermal Monitoring Systems

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Objectives/Scope: Geothermal fields often require pumping systems to achieve commercial production rates and pressures. In lower-enthalpy fields, line-shaft pumps (LSPs) have traditionally been used to supply brine to binary plants, while self-flowing production wells have been relied on in higher-enthalpy fields to power flash plants. However, the use of LSPs is impractical in deviated wells because of the limited length of the pump shafts. Additionally, the evaporation of a portion of the produced mass in flash geothermal power plants can lead to declining reservoir pressures and reduced flow rates. Despite their historical use, the use of LSPs poses significant challenges in geothermal applications. The maintenance and servicing of LSPs can be complex and time-consuming, requiring frequent interventions and potential production disruptions. Moreover, LSPs are often limited in terms of their depth capability, preventing their deployment in deep geothermal wells where enhanced production potential could exist. These limitations have created a need for innovative technologies to overcome the constraints associated with LSPs and optimize geothermal production.

To address these challenges and enhance geothermal production, a new, innovative technology in the form of ESPs has emerged. Unlike LSPs, ESPs can be installed in deviated wells, enabling continued production from self-flowing geothermal wells and production in wells where flow has diminished because of pressure depletion. This breakthrough in ESP technology provides a reliable and efficient solution for geothermal operators, unlocking new opportunities for reservoir optimization and energy extraction.

Methods, Process: This study provides a comprehensive overview of the key components of the ESP system, including the motor, protector, pump, power cable, motor lead extension, and downhole sensors. The new ESP system demonstrates improved reliability, power density, and operational efficiency by using high-efficiency permanent magnet motors, innovative encapsulation technologies, and optimized pump designs. The paper also highlights the successful field trial of the newly developed geothermal ESP in Kizildere Field that showcased its enhanced reliability and increased production in a high-temperature environment.

Results, Observations, Conclusions: The findings from this trial have paved the way for the design and implementation of the new ESP system in additional high-enthalpy wells, further expanding the application of ESP technology to geothermal energy extraction. Overall, this paper underscores the transformative potential of ESP technology in enhancing the use of geothermal resources for sustainable energy production.

The key findings from this study demonstrate the remarkable success of the newly developed ESP in high-enthalpy geothermal wells in Türkiye. The field trial results from well (case of study)

in the Kizildere geothermal field have shown that this new, high-temperature ESP can significantly increase production rates. The introduction of this technology boosted production by 56%, demonstrating its potential to tackle the critical challenges faced by the geothermal industry.

Novel/Additive Information: This project will provide to the geothermal industry an alternative that unlock numerous avenues for its further expansion and adoption in geothermal power plants worldwide. With the operational temperature range of the geothermal ESP surpassing the limitations of previous ESPs, operators are now able to use artificial lift in high-temperature wells previously inaccessible to this technology.

Further development in geothermal energy production is key to promoting sustainable and renewable energy, and the creation and application of high-temperature geothermal ESPs are central to this effort.

Freitag, 1. März 2024, 11.40 Uhr
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Friday, 1 March 2024, 11.40 am
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Ageli, two experts coopering to produce lithium with low environmental impacts from geothermal brine in the French Upper Rhine Graben

Ageli, zwei Experten, die zusammenarbeiten, um Lithium mit geringen Umweltauswirkungen aus geothermischer Sole im französischen Oberrheingraben zu gewinnen

Ludovic Donati[1], Joanne Jung[2], Clément Baujard[2], Olivier Michelon[1], Jonathan Joseph[2], Eléonore Dalmais[2], Maxime Requillart[1], Denis Beltrami[1], Kateryna Omelchuk[1], Guillaume Ravier[2]
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Électricité de Strasbourg (ÉS), and Eramet have signed a cooperation agreement on January the 23rd 2023 and joined their knowhow and expertise to develop the Ageli (Alsace Géothermie Lithium) project. ÉS is a leading regional company in Alsace, active in renewable energy production, distribution, electricity and gas supply. ÉS is currently operating two geothermal plants in the French Upper Rhine Graben: Soultz-sous-Forêts and Rittershoffen. Eramet is a global mining and metallurgy group developing the critical metals for the energy transition. ERAMET has developed a direct lithium extraction (DLE) process and will start a 24,000 t/year LCE plant at Centenario in Argentina in first half-year 2024. This DLE increases lithium yield to more than 90% and speeds the production process to just days.
The Ageli project aims to produce at least 10 000 t/year of Li2CO3 with low environmental impacts from a geothermal reservoir located in the northern part of the French Upper Rhine Graben (URG). Most of the geothermal plants in the URG have a Li concentration over 150 mg/L and feasibility of extracting it under pressurized conditions was demonstrated within a research project (Fries et al, 2022). Previous scoping studies has shown that an approximate flowrate of 1500 m3/h of geothermal brine is required to reach this target. Based on operating data, at least five production wells and five injection wells would be needed to achieve the 1500 m3/h.
ÉS and ERAMET started in 2023 a prefeasibility study (PFS) following best up to date mining standard. This PFS include different workpackages (WP) focused on subsurface engineering, surface engineering, permitting, Corporate Social Responsibility (CSR) and business plan. In early 2024, Subsurface studies will confirm the number of wells and locations, the number of geothermal plants. A pilot plant has been installed at the Rittershoffen geothermal plant, for a long-term testing in order to confirm the stability of the sorbent in operating condition (20 bar and 85°C). Results of the pilot will be completed with lab testing and will provide important data for the surface engineering WP. Energy synergies between geothermal plants and the lithium process will be a key point of the Ageli project. As public acceptability is a key for the success of this project, a communication and Engagement plan dedicated to this project is implemented.
End of this PFS is expected in October 2024 and this collaboration will move to a Detailed Feasibility Study (DFS) early 2025. Start of the execution of the complete geothermal-lithium Ageli project is expected from 2027 and a commercial production of Li2CO3 will be achieved by 2030.

Fries, D., Lebouil, S., Maurer, V., Martin, C., Baujard, C., Ravier, G., Boguais, R., Amari, S., Lithium extraction through pilot scale tests under real geothermal conditions of the Upper Rhine Graben. Proceedings, European Geothermal Congress, Berlin, Germany, 17-21 October 2022.