Reuse of hydrocarbon wells for Enhanced Geothermal System development

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Keywords: Groß Schönebeck, Petrothermal, EGS, Reuse of hydrocarbon wells, North German Basin

Petrothermal energy is a large indigenous resource capable of providing baseload electricity and heat that has yet to be tapped. This is because the exploration, drilling, and development costs of the technology to exploit this potential, referred to as Enhanced Geothermal Systems (EGS), are still high compared to conventional hydrothermal geothermal resources. After decades of research and development to prove its technical and economic feasibility, EGS technology has now reached a stage where commercial development is within reach. However, the upfront exploration risk and high drilling costs associated with the development of EGS remain high. Recent EGS demonstration projects show that reuse of existing data and infrastructure may significantly reduce both costs and risk. Therefore, this study aims to develop the engineering workflow of retrofitting hydrocarbon wells and evaluate the pre-existing conditions suitable for developing Enhanced Geothermal Systems. The study area focuses on the North German Basin considering its hydrocarbon potential with a certain amount of former hydrocarbon infrastructure. According to previous studies, the North German Basin, with a temperature gradient of 32 ℃/km, has potential for EGS development. Literature reviews and reservoir simulations were performed based on the existing Enhanced Geothermal System (EGS) site Groß Schönebeck. Based on the results, we evaluate the best conditions and procedures for the development of EGS demonstrators by reusing existing hydrocarbon wells for production, injection or monitoring.