

Energy From the Upper Jurassic (Malm) – A Synoptic View of Geothermal Exploration and Production in the South German Molasse Basin

Alexandros Savvatis¹, Ulrich Steiner¹, Christian Hecht², Roman Koch³

¹ERDWERK GmbH, Munich, Germany.

²SWM Services GmbH, Munich, Germany.

³GeoZentrum Nordbayern (GZN), Erlangen, Germany.

ABSTRACT

Geothermal energy supply from deep sedimentary basins challenges both, scientists and engineers. It's not only the high demand in temperature and yield, and thus deep and complex drilling, but also the appropriate surface infrastructure and heat demand to provide an economic viable frame for geothermal projects. The presentation reflects on the experience of 15 years of deep geothermal exploration and production of Upper Jurassic carbonates, demonstrating its hydrogeological background and exploitability. We have analysed the reservoir section of about 30 geothermal wells, determined the geological and hydraulic properties from cutting analysis, from logging and from pump tests. The data compiled has been used to optimize the exploration strategy. Based on this, the position of drivers for the inflow zones and overall productivity of the geothermal wells are a complex interaction of: a) carbonate diagenesis with different degrees of dolomitisation, b) expression of lithofacial units, c) local stress anomalies in fault zones, and d) extension of carstification pattern. Sophisticated software for geological modelling and fluid simulation helps to understand the reservoir properties and its long-term behaviour. The 30 wells analysed are the database for a statistical approach to predict the future potential of geothermal energy production. A recent 3D seismic survey provides the model base to evaluate the full reservoir potential in the subsurface of the area of Munich for its heat supply system. Since drilling in urban areas is restricted to limited locations a comprehensive surface to subsurface study has to be generally established, where for the first time a field development of targeted 400 MW thermal is set in place. The goal of the recent presentation is to show the research results demonstrating how much energy is potentially and actually available from the subsurface and what the requirements are for a decision-making workflow for optimal exploration.