

Donnerstag, 24. Juni 2021
Kongress 1 - Tiefe Geothermie
12.40-13.10 Uhr

Geothermal opportunities of the Upper Rotliegend in the North German Basin (NGB)

Bob Harskamp, Well Engineering Partners (WEP)

The road to Geothermal Energy has just been started in the Netherlands. Of the 6300+ wells drilled in the Netherlands, only 55 geothermal wells (24 geothermal energy plants) were drilled so far. Those wells have a total capacity of about 307MWth, producing 3PJ of heat each year. Current plans are to increase the amount of production plants to 700 by 2050, producing more than 200PJ/Y. At the moment there are 37 geothermal energy plants in operation in Germany, of which 33 produce heat, 9 produce electricity and 5 are combined geothermal power plants providing both heat and electricity. In total, the plants produce 336,51 MW heat output and 37,13 MW electricity output (2019). According to the German Geothermal Association (Bundesverband Geothermie), the leading industry association for geothermal technology in Germany, 3 projects are being constructed or are in operation, 5 projects are investigated for geothermal potential and approximately 30 further plants are currently being planned. The sandstones of the Upper Rotliegend (i.e. Slochteren Formation) are one of the major reservoirs in the Netherlands. At the moment, 17 geothermal wells are producing heat from this reservoir. Production results are good. Some of these wells, at a depth of about 2km, produce up to 500m³/h of water with a capacity up to 18 MWth.

Upper Rotliegend strata of the Southern Permian Basin extend E-W from Poland to west England and N-S from the German/Danish border to northeast of Frankfurt/ Germany. The basin centre was located in northern Germany, accommodating a succession of up to 2000m in thickness. The North German Basin (NGB) is a sub-basin of the Southern Permian Basin.

The Silverpit and Slochteren Formations in the Netherlands correlate with the Elbe Subgroup in Germany. The Elbe Subgroup is divided in the Dethlingen and Hannover Formations. The Havel Subgroup, below the Elbe Subgroup, has also geothermal potential.

The Dethlingen Formation attains a thickness of 675m in the northern part of the North German Basin (borehole Schleswig Z1; Schöder et al., 1995). The Hannover Fm. attains in the northern part of the North German Basin a thickness of almost 700m (borehole Schleswig Z1; Schöder et al., 1995). The Havel and Elbe subgroups have a combined thickness of around 2500 m (Plein, 1995; McCann, 1998b) Several areas in Germany are suitable for heat and electricity production but the most promising is the NGB area which yields enormous geothermal resources. According to one source there could be up to 13 000 EJ (1,3 × 10⁷ PJ) heat in place in Palaeozoic (Upper Rotliegend) and Mesozoic reservoirs. Thus far, these resources are only exploited at a few localities.

Up to now, geothermal exploration in the NGB focused mainly on hydrothermal Mesozoic reservoirs, most of which are Cretaceous and Triassic sandstone reservoirs. Those reservoirs frequently have insufficient reservoir qualities, i.e. low net-thickness and permeability, resulting in low flow rates.