

Bunter Reservoir Quality for Geothermal Applications in the South Holland Area

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Geothermal energy is green and sustainable. Formation water at depths greater than 3000m in the Netherlands is a potential source of energy to generate electricity. Over the study area observed formations are buried deep enough to reach water temperatures in excess of 100⁰C, and this could conceivably be used for the generation of electricity with very low CO₂ emissions. Four seismic surveys were interpreted and integrated with well data including well tops to help in this evaluation. The Detfurth and Volpriehausen (Triassic) of the West Netherlands Basin in the South Holland area are established to be potentially good reservoirs for geothermal development.

Generally, the reservoir interval contains enough thick sequences of porous sands. The gross thickness ranges from 95m in well VAL-01 to 163m in P15-14. Two porosity/permeability relationships have been used for calculating N/G at various permeability cut-offs of 0.1mD, 1mD, 10mD and 100mD. Net sand ranges from 0.14m to 58.04m for 10mD and 0.1mD permeability cut-offs respectively. The zone in and around Wells MON-03, P18-A-02, P15-01 and P15-14 show the best reservoir intervals based on average porosity and N/G values. Based on different scenarios the average porosity ranges from 6.5% to 16.2% and N/G ranges from 0.6% to 30.8%. Primary porosity and permeability are generally low in the mapped area, but it is expected that permeability and connectivity are enhanced locally through fracturing. The objective is highly faulted, and hence this will serve as conduit for water leading to a higher level of connectivity and water production. Heterogeneity remains an issue of concern due the high level of Vcl in some of the intervals. But it is believed that they will generally not serve as a barrier or baffle to flow, i.e. it will reduce the vertical permeability but not the important horizontal permeability.

The objectives in the mapped area suggest that aeolian and fluvial facies occupy more than 50% of the rock unit. The focus of the oil industry is on the structural highs. Prospective areas for geothermal exploitation occur in lows. It is suspected that the shallow oil fields have porosities representative of much greater depths. This is borne out by the fact that there is hardly any relationship of porosity against depth. When this proves to be accurate it would have a very positive effect on the development of geothermal energy, since this reduces the uncertainties involved in a project like this.