

## **Targeting Reservoir Sandstone for Deep Geothermal Energy Production: Challenges and Heterogeneous Reservoir Model Construction**

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Stacked distributary-channel deposits in a lower coastal plain syn-rift setting (Delft Sandstone Member, Lower Cretaceous, West Netherlands Basin, The Netherlands) are the target for the Delft Geothermal Project. The objective of this university-initiated project is to drill a geothermal doublet on the university premises. The doublet will produce hot water from one well; cooled-down water with CO<sub>2</sub> is re-injected into the same sandstone at two kilometer distance from the production well. Drilling permission has been granted.

The West Netherlands Basin is an oil and gas province in The Netherlands; hydrocarbon accumulations are mainly found in structural traps. Core, well-logs and cuttings analysis from nearby wells penetrating the Delft Sandstone Member show 1.0-4.5-m-thick fluvial sandstone beds embedded in floodplain fines. Overall net-to-gross is 0.66.

Challenges are to assess the thickness, width, stacking patterns, depositional trend, lateral connectivity and permeability distribution of the fluvial sandstones. In this paper we present the lithofacies analysis of the target reservoir sandstone, and the construction of a spatial permeability model based on the available log data and core analysis. A static heterogeneous reservoir architecture model was created accordingly. An uncertainty analysis is presented and various scenarios for optimal doublet placement are reviewed.

The results of this study form the basis of a dynamic reservoir model and will help in the risk assessment of the Delft Geothermal Project.