

Maximizing output and lowering risks for geothermal development using seismic inversion and machine

Publieke samenvatting / Public summary

Aanleiding

Geothermal energy has a very large potential and will play a big role in the energy transition and CO₂-emission reduction targets. Currently, however, geothermal projects in the Netherlands are often faced with difficulties. Insufficient knowledge about the geological characteristics of geothermal reservoir causes uncertainties about energy yield, costs and hazards. This often makes it hard to attract financing and (public) support for these projects, causing them to be delayed or cancelled. Building a reliable business case is often difficult because estimates of energy yield and cost are being made based on assumptions and very general reservoir properties. Currently no methods and techniques are available that allow the utilization of (available) data about the subsurface for geothermal project development. The MAXIM project aims to develop these methods and techniques, thereby allowing for lower costs, optimized yields and minimized risks of geothermal projects.

Doelstelling

The project proposes the development and validation of a new method for characterizing geothermal reservoir properties. This new method is expected to contribute to obtaining a better understanding of the subsurface, will allow sharing of knowledge among stakeholders, will lead to lowering risk and enhancing the chance of success. This new method will specifically allow the following:

Projectinformatie / Project information

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TGE0119007

Subsidiebedrag / Grant amount
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Algemene informatie / General information

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Getting reservoir properties (porosity as a proxy for permeability) laterally from seismic in order to be able to update the reservoir model and P10-P90 predictions. This will result in a significant narrowing of the P10-P90 range, allowing for better predictions of yield and costs • Optimizing well placement by choosing the best path through the reservoir on detailed maps of reservoir quality • Revealing channels systems within the reservoir that could be used directly for geothermal exploitation. • Increasing the understanding of reservoir connectivity (a key subsurface-related risk) • Revealing possible (residual) hydrocarbons within the reservoir that may have impact on the economic and safety planning • Mitigate drilling hazards (e.g. hard layers) that have led to failed wells in the past.

Korte omschrijving

The activities focus around three main modules; the first being the investigation of possibilities of and development of machine learning in the rock properties analysis process. The second activity is to perform WEB-AVO seismic inversion including the application of the Machine Learning technology for the transformation of elastic to rock properties (porosity) to three typical geothermal plays in The Netherlands. A newly to be developed approach for structural model building and volume calculations will be performed, trying to establish enhancements in P90-P10 estimate ranges (comparing the predicted and after drilling results). The three proposed typical geothermal plays ('trials') are Existing plays - Cretaceous / Jurassic in Western Netherlands Basin, an existing play ('white spot') project and New plays - Alblasterdam - Western Netherlands Basin. After applying the new workflow to each play a Value of Information evaluation on the results will be performed, with project partners and advisory board representing the geothermal industry.

Resultaat

The expected project outcome is to • create an enhanced and customized workflow for reservoir characterization of specific geothermal plays; • increase the value added by applying machine

learning to enhance the workflow and contribute to providing more comprehensive and stable results; • and to make more valuable information available for more. The project focuses on integrating expertise from all partners by collaboration on trial datasets. The aim is to enhance the understanding of not only the workflow but also the impact of data availability and quality as well as the results of the seismic inversion and their value to the geothermal reservoir characterisation. Creating a better understanding of the subsurface plays an essential role in narrowing the P10-P90 range, this project aims at a 10% enhancement on uncertainty reduction. This results in reducing geothermal project risk and supports a more favorable environment for project investments and insurances. The play-based approach opens ways to share data and results between geothermal projects. This is beneficial for the purpose of efficiency, reduces risks and creates the opportunity to share risks across different pro

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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