

DEEPLIGHT

Publieke samenvatting / Public summary

Aanleiding

For the transition towards a climate-neutral energy system the Netherlands has the ambition to have geothermal energy as a heat source for the build environment and for industrial processes. This will require a significant number of geothermal wells to be drilled. The costs for geothermal well construction make up large part of the investment costs. Reduction of the drilling costs will have a positive impact on the business case for geothermal heat production. A significant cost reduction for construction of geothermal wells can only be achieved with novel drilling and well construction concepts. Electric Pulsed Power (EPP) is a promising technology to improve geothermal drilling in subsurface formations and which concept for rock breaking via EPP has been proven in large scale experiments in Germany and the Netherlands. As this innovative technology requires no mechanical contact and weight on the drilling bit, it opens the door to substantially shorten the well construction time and offers the opportunity to drill deeper and larger diameters within the same time compared to conventional drilling systems.

Doelstelling

The overall goal of this project is to reduce the cost and environmental footprint of geothermal well construction by introducing a new game changing integrated drilling and well construction technology. This new drilling concept, based on Electric Pulsed Power technology, comes with a new way for casing placement, optimized settings and parameters for an efficient drilling progress, and with a new cement type for optimized wellbore sealing and integrity

Projectinformatie / Project information

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Subsidiebedrag / Grant amount

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Algemene informatie / General information

Penvoerder / Secretariat

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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monitoring of larger-diameter wells The objective of this project is to develop and evaluate this new well construction technology for pilot tests and commercial projects eventually. This will be achieved with a Dutch consortium active as part of an international consortium consisting of world-class knowledge partners from academia and industry from five different countries that will closely cooperate on this subject in a GEOTHERMICA project. Via this project the conditions and requirements for application of the technology for the various relevant geological conditions in the Netherlands will be tested and validated.

Korte omschrijving

This project will make use of world-leading numerical competence, specialized research laboratories and large-scale experimental drilling facilities and case studies. The project activities will focus on four main topics (i) EPP drilling technology, (ii) casing while drilling and system integration, (iii) hole cleaning and (iv) geothermal well cementing and will integrate these sub-systems into a novel geothermal drilling concept. Furthermore, technical coordination will take place daily to ensure the system requirements and integration from end-user perspective considering operational system requirements. All these activities are complemented with ones focusing on the evaluation and communication of the economic, environmental and societal impact and benefits of the novel drilling concept. Specific activities of the Dutch parties concern technical coordination, design, construction and subsequently conducting large-scale experiments for testing and validation of the drilling technology. Furthermore, model development and validation are taking place to obtain design optimization and system design parameters.

Resultaat

The project delivers results that will facilitate renewable heat production by providing ground-breaking geothermal drilling solutions to overcome current technological limitations and financial hurdles for a large-scale implementation of geothermal energy production. The results will

contribute to make the construction and operation of geothermal wells cost-efficient, sustainable and reliable using the developed EPP drilling technology and when combining it with casing drilling and novel cementing options into an integrated, novel drilling concept. The main project results concern: - An EPP drilling technology tested in full-scale drilling environment, able to operate in conducting fluids with a method of steering as well as high level of robustness and a long lifetime at TRL 6 - A novel, integrated drilling DEEPLIGHT EPP-casing while drilling workflow that makes use of the innovative system components and a validated semi-empirical hole cleaning model for EPP-Casing while Drilling settings as well as drilling parameter optimization for an efficient drilling progress - Evaluation and communication of techno-economic, environmental and social impact of the novel drilling concept

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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