

## **GeoWell: Reliability analysis of tubular and cement technologies**

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**Keywords:** high temperature geothermal, well integrity, barrier elements, reliability analysis

In high temperature geothermal applications, the integrity of production wells need to be maintained and the wells should be kept in operation for several decades for sustainable economic performances of such projects. This should be achieved despite of the aggressive nature of geothermal fluids and high temperatures that adversely affect the conditions of well barrier elements, e.g. casings and cement. With the objective to improve the integrity of geothermal wells in high temperature environments (450°C), the Horizon 2020 GeoWell project was kicked off in 2016. The activities within the project, particularly the development of tubular and cement technologies, are intended to reduce well integrity problems observed in high temperature wells. These new technologies can cause changes in operating life and thereby well integrity. To assess the change in well integrity, a reliability analysis has been performed. The reliability analysis is based on identifying which failure modes have changed probability of occurrence or consequence when changing from conventional technologies to those developed in the project. The change is probabilistically quantified based on results from modelling and experiments performed in the project on the developed technologies and data from conventional cases. A model, which is made based on probabilistic design of well barrier, is used to relate reliability to specific wells. A model for estimating the change in reliability that could be experienced by employing the developed technologies, is presented. Together with a sensitivity analysis, this supports a discussion on which conditions could benefit most from new technologies.