

## **A simplified model for estimating the environmental impacts of geothermal power generation**

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Although the contribution of the geothermal sector to global electricity production is yet minute, geothermal energy is projected to play a key role alongside other renewable technologies in decarbonising the power generation sector and thus in supporting national and international carbon reduction goals.

The evaluation of the environmental performance of geothermal power can be challenging and time-consuming (especially for practitioners not familiar with the geothermal sector) because it is highly dependent on local geological conditions and other specific technical parameters.

This work presents the development of a user-friendly tool based on a parametric model for the estimation of the environmental impacts from conventional and enhanced geothermal technologies for electricity generation. We envisage the tool being used as a screening method to aid policy- and decision-making, for instance in supporting future geothermal projects.

The simplified parametric model relies on a total of three parameters for each technology type; these are: i) average depth of geothermal wells, ii) installed capacity, iii) operational carbon dioxide emission (for conventional technologies), and iv) specific diesel consumption for wells drilling (for enhanced technologies). The model quantifies the impacts within 16 environmental categories, including climate change.

The proposed parametric model was developed by means of Global Sensitivity Analysis - using the methodology developed by Sobol' - from a complex parametric model that relies on a total of 20 parameters, which were assumed being mathematically uncorrelated (a necessary condition for Sobol'-based Global Sensitivity Analysis).