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Evaluation of the efficiency and impact of a shallow geothermal installation. Case of Can Batlló, Barcelona.

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The “Can Batlló” factory was built on the Can Mangala between 1877 and 1879, as a cotton yarn and fabric, as well as bleaching, printing and sizeing factory. It is intended to install a geothermal system for the air conditioning of an administrative building in the city of Barcelona in one of the factory´s buildings.

The purpose of this study is to confirm whether the proposed energetic demand can be achieved in a sustainable manner and to assess potential impacts in the subsurface over time.

The numerical model of flow and heat has been pre-calibrated with the regional flow model and thermal response test (TRT) of the area. The results indicate that the extracted geothermal energy could be higher (12-20% more) than the initial design. This higher performance would imply an optimisation of the system. It could be implemented by means of modifying the design of the heat exchangers, by reducing their amount and their length, or by changing the location of the exchangers to the whole location of Can Batlló, and not reducing their installation to a single building. Therefore, in addition to being able to design a more efficient and economic geothermal system, the investment could be recovered sooner[Rotman Cr1] .

Simulations at 10 years of geothermal exploitation indicate that a downstream plume may occur. This variation of the natural subsurface temperature can affect the environment.

Although the analyses carried out have made it possible to know the behavior of the subsurface in the front of this geothermal installation, to make a deeper study would be advisable to determine in more detail the long-term effects (more than 10 years) that it can cause in the subsurface. For this reason, the following tasks are recommended: (1) To create a control network at the scale of the study area to monitor the performance and the effects of the geothermal field once its installation is on operation; (2) To define the optimal characteristics of the exchangers to obtain a better geothermal performance; (3) To perform a drilling of a minimum depth of 200 meters to verify the materials described in the data collection; (4) To perform hydrochemical and isotopic analysis of the executed point to analyze the feasibility of possible groundwater uses; and (5) To carry out the conceptual and numerical modelling of the local and regional hydrogeological and

geothermal system with the detail obtained with the previous point and to analyze the optimisation scenarios mentioned above.