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Characterization of Lower Cretaceous Aquifer in Lisbon region for geothermal potential assessment

Marrero Diaz, R. , Costa, A. , Duarte, L., Ramalho, E., Rosa, C.

Laboratório Nacional de Energia e Geologia (LNEG), Alfragide, 1100-288, Lisbon, Portugal.

Abstract:

Oil and gas prospecting surveys and drilled wells carried out in Lisbon region (Portugal) since 1960s combined with heat flow density maps of the region [Correia et al., 2002], provided evidence of geothermal resources with potential to be exploited for direct uses. These potential geothermal resources are mainly related to a multilayered aquifer in sandstones of Aptian-Albian age, lower Cretaceous, overlaid by low-permeability upper Cretaceous basaltic lavas and pyroclasts and Paleogenic marls, which confers semi-confined (mostly artesian) conditions. This low salinity (~0.5g/L) aquifer seems a priority target for geothermal exploitation projects for direct uses, given (i) its relatively high subsurface temperatures (50°C at ~1500 m depths), and (ii) its dependable reservoir properties (between 200 m and 560 m net thickness; 2 to 70 m²/d transmissivities; 15 to 25% of effective porosity) eligible to 50 – 150 m³/h well productive capacities [Carvalho and Cardoso, 1994] [Correia et al., 2002].

The present communication shows the main characteristics of the lower Cretaceous Aquifer (LCA) in the Lisbon region, which will be thoroughly studied in a 3-year research project (2012-2014) whose main goal is to elaborate a physical-chemical conceptual model. The LCA's conceptual model should enable to determine: depth and direction of groundwater flow; water-rock interaction processes; LCA geometry; recharge areas, origin and residence time of the fluid, etc. In this way, the research project intends to identify these potential geothermal resources, defining its geothermal potential and exploitation constrains as sustainable and non-polluting thermal energy resource in Lisbon area. Until now, collected data seems to point out for the existence of several compartments instead of a unique aquifer all over the area. This can become a constraint for the exploitation, since the amount of water can become small in some areas. This and the fact that the area is highly urbanized, affecting recharge, will be considered in order to evaluate the amount of geothermal resources available. The appropriate monitoring systems and exploitation plans will be developed to support the sustainable exploitation of this renewable energy source.

References:

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