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Assessment of geothermal resource potential and analysis of geothermal well heat exchange

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The purpose of this research is to evaluate the potential of geothermal resources and heat flow characteristics as well as scheme of Enhanced Geothermal System(EGS) and Complex Energy Extraction from Geothermal resource, (CEEG) in Zhi-Ben area , Taiwan. A three-dimensional conceptual model has been developed based on the site information including lithological character, hydrogeological data, etc. Then the simulator, TOUGH2, has been carried out to construct a comprehensive hydrothermal model of the study area. In this research, we firstly assess groundwater potential zone of Zhi-Ben river watershed integrating with lithology, land cover/land use, drainage, slope and lineaments. The field investigations and collections of data including surface geological survey, geo-structure, geophysical methods (self- potential, nature radio-activities, electrical resistivity tomography), geochemical data, groundwater level and temperature of wells as well as geothermal gradient are performed to establish hydrogeological conceptual model. The model can be used to describe the groundwater characteristics in Zhi-Ben area. Furthermore, the model accompanying with TOUGH2 will use to evaluate the potential of geothermal resources and observe heat flow behaviors of heat reservoir under the consideration that the geothermal potential zone is defined. Finally, the sensitive analysis of heat production of geothermal wells in terms of geological variables of potential zone will be calculated by numerical model TOUGH2 in EGS and CEEG, respectively. Computational results indicate that the geothermal energy produced from abandoned wells depends largely on the geothermal gradient. The research can be the reference in development in management of geothermal areas.