

## **GEOTHERMAL MANAGEMENT IN BEIJING**

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### **ABSTRACT**

Sustainable development has been widely accepted all over the world, and sustainable use has been the endeavored objective for any natural resources, including geothermal. For most geothermal fields, the sustainability is limited by a lack of liquid recharge, rather than a lack of heat recharge. The extraction of geothermal fluid often causes a continuous lowering of the pressure of the production wells. It is necessary to keep a good balance between the geothermal fluid production and recharge. This is often a very difficult task, because the changes, on the fluid pressure of the production wells and the surrounding area, caused by production of geothermal fluid is often difficult to foresee. On the other hand, the recharge of a geothermal system is also difficult to predict, and it may change along with the amount of geothermal fluid production and the distribution of the production.

There are a few very important aspects for keeping the balance between the fluid production and recharge of a geothermal field, such as: (1) Controlling the fluid production, which is often very difficult for geothermal fields that there are more than one user; (2) Reinjecting the used geothermal fluid back into the producing geothermal reservoir; (3) Monitoring of the geothermal system, including the amount of fluid production and reinjection, the pressure and temperature changes in the dedicated monitoring wells, as well as in the production and reinjection wells, the changes of chemical components of the production and reinjection fluids etc., (4) Modelling of the geothermal systems, by means of using the monitoring data properly; (5) Planning of geothermal utilization.

There are abundant low-temperature geothermal in Beijing, and it has had an almost 40 year history of scaled geothermal utilization, including space heating, bathing, swimming pools, health spas and recreation, greenhouses, fish farming etc. Owing to over extraction of geothermal water, the pressure of the geothermal wells has started to decline rather fast in the most important geothermal fields since the early 1980's. To realize sustainable use of geothermal resources, a lot of measures have been applied in Beijing. As a result, the water level decline of the most important geothermal fields, such as Southeast Urban and Xiaotangshan, have been greatly reduced, even stopped recently in the later one.

In this paper, the geothermal resources and the utilization will be briefly introduced. The geothermal management practice and the related effects will be presented in detail.