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Geothermal Heat Pump System in Central Tokyo

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Geothermal heat pump systems become popular in the western countries, but they are still less popular in Japan. The number of working systems in Japan is estimated to be several hundreds, which are three orders of magnitude lower than those in the western countries.

A new geothermal heat pump system began to work practically for an office building in the Central Tokyo in November, 2008. A preexisting conventional air-source heat pump system was replaced for a new geothermal heat pump system. Eight boreholes of 75 m deep for heat exchange were drilled in the front yard of the building. A thermal response test was applied to determine the thermal resistivity of the geothermal heat exchanger and the surrounding sediments. The geological succession of the boreholes from the ground level through -75 m is Quaternary sediments including permeable gravel deposits of several meters thick. The performance of the geothermal heat pump system has been stable and reduced consumption of electricity.

A geothermal heat pump system is much more efficient than a conventional air-source heat pump system. A geothermal heat pump system also contributes to mitigating a heat-island phenomenon in big urban areas like Tokyo, because it does not emit exhaust heat outside in summer.

Keywords: geothermal, heat pump, heat island