

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

©2011. Japan Geoscience Union. All Rights Reserved.



AHW024-13

Room:102

Time:May 27 18:00-18:15

Two year Performance of the Ground Source Heat Pump System in Central Tokyo

masakatsu sasada^{1*}, Shinji Takasugi², Masayuki Tateno²

¹Geo-Heat Promotion Association of Japan, ²GeoSystem Co. Ltd.

According to the statistics published by the Ministry of Environment, the installation number of the ground source heat pump system in Tokyo Metropolitan exceeds 50 in 2009. A ground source heat pump system was installed for a small office building in Central Tokyo two years ago. It is made mainly up of a water-source heat pump unit, 8 boreholes of 75 m deep for heat exchanger, and polyethylene pipes. Coefficient of Performance (COP) of the heat pump system was 4.3 in average for the first year. Forty nine percent of electricity was reduced by the ground source heat pump system, compared to the conventional air source heat pump system previously worked there. Geology of the building site is unconsolidated Quaternary sediments of gravel, sand and silt, and their thermal conductivity was estimated to be 1.8 W/m/K. Thermal energy of 51 GJ was produced from the ground source and that of 53 GJ was discharged there during the first year.

In the second year, the temperature in the summer was much higher than that of the usual year, resulting in much recharge of heat energy into the ground. The heat pump system was switched from ground source to air source to accommodate the high ground temperature at the beginning of the autumn. As the result of this control the ground temperature became to be equal to the original one when the heat pump operation was just two years old. Such good balance of subsurface heat exchange suggests sustainability of the heat pump system working for the building.

Keywords: ground source, heat pump, thermal conductivity