



POLISH AND NORWEGIAN CITIES
together for climate and energy



GEOTHERMAL HEATING PLANT IN MSZCZONÓW

Sector: Geothermal energy use

Timeframe: 1999

Location: Mszczonów, 58 Sienkiewicza str.



Photo: Geotermia Mazowiecka company

PROJECT BACKGROUND

In 1995 Geotermia Mazowiecka S.A. company was established to build and operate a geothermal heating plant in Mszczonów (Mazowieckie Voivodeship), as well as to assess the possibilities of obtaining co-financing for similar investments implemented in cooperation with national and foreign institution in neighbouring Skierniewice and Żyrardów. The main shareholders are the Voivodeship Fund for Environmental Protection and Water Management in Warsaw and in Łódź, municipalities of Żyrardów, Skierniewice, Mszczonów and Sochaczew, Hydrorest SKANSKA S.A. company and the others. Company's activities resulted in 2000 in putting into operation the third Polish geothermal heating plant. It is located in Mszczonów, which has 6 000 inhabitants and lies south-west from Warsaw.

PROJECT DESCRIPTION

Municipality of Mszczonów was the initiator and the executor of the project, while the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences, seated in Cracow, provided scientific supervision of the investment. The gas-geothermal heating plant in Mszczonów uses geothermal waters present in the Mesozoic sub-basins of the Polish Lowlands (Grudziądz/Warsaw Sub-basin and Szczecin/Łódź Sub-basin). The aquifer is located 1602 - 1714 m below the surface, in Lower Cretaceous sandstones, and the temperature of the

formation water comes to 45°C. The water is exploited from the Mszczonów IG-1 well drilled in the 1970s and then reconstructed and adjusted to the geothermal water exploitation in the period 1996-1997. The geothermal water is exploited in a one-well system. Lack of necessity to pump the water back into the deposit significantly reduced the cost of the whole investment.

The maximum yield of water exploited using multi-level deep-well pump reaches 55 m³/h, while the water temperature at outflow comes to 42,5°C. The geothermal heating plant in Mszczonów functions as a hybrid system using heat from geothermal waters, gas-fired boilers, absorption heat pump with the capacity of 2,7 MW and compression heat pump with the capacity of 1 MW. Thermal water extracted from the Mszczonów IG-1 well is first transported to the heat exchanger cooperating with the high-temperature boiler, where it absorbs heat from flue gases leaving the boiler (reducing their temperature below 58°C). The process is accompanied by the condensation of water vapour contained in flue gases. From the heat exchanger the water of 42°C is transported to the absorption heat pump, where - depending on the current need - it is being chilled to the temperature of 20-30°C. In the next step the water is fed into the fan water chiller. Heat energy transferred from water to air is used on site to heat the plant's building.

After being used for heating purposes, chilled geothermal water is directed to the nearby water



treatment station, where it is mixed with the quaternary water, treated and supplied to the municipal water distribution system as high-quality drinking water. Mszczonów's geothermal waters are unique in Europe due to their specific properties, including very low mineralisation level (below 0,5 g/dm³). Other geothermal waters extracted from the similar depth and ranked as fresh waters were found so far only in a German city of Erding.

The total installed capacity of the plant reaches 8,3 MWt, including 3,7 MWt coming from the geothermal waters. In the heating season 38,2% of the heat supplied to the citizens is generated using geothermal energy. Annually, the gas-geothermal heating plant in Mszczonów produces 42 TJ of heat (including 15,6 TJ from geothermal source).

In order to increase the degree of geothermal waters usage it was decided to use them also for recreational purposes, which improved touristic attractiveness of Mszczonów. Since 2008 Mszczonów's thermal waters are used both for heating the premises and for supplying the swimming pool basins in the modern complex called „Termy Mszczonowskie”.

FINANCING SCHEME

Heating plant in Mszczonów was constructed in 1999 within a targeted project co-financed by the State



Photo: Geotermia Mazowiecka company

Committee for Scientific Research, EKOFUNDUSZ Foundation, Polish-German Cooperation Foundation and the Voivodeship Fund for Environmental Protection and Water Management in Warsaw and in Łódź. The total investment cost reached 10 749 000 PLN (approx. 2,5 Mio EUR). In 2011 the company implemented the project entitled "Construction of the heat recovery installation in the geothermal heating plant in Mszczonów". The investment of 1 879 000 PLN (approx. 437 000 EUR) was financed from the loan granted by the Voivodeship Fund for Environmental Protection and Water Management in Warsaw and from own funds.

PROJECT RESULTS

As a result of the investment the municipality of Mszczonów gained stable, modern and environmentally friendly heating system. The gas-geothermal heating plant replaced three obsolete boiler houses fuelled with powdered coal, which emitted 15 tonnes of NO_x, 60 tonnes of SO_x, 9 700 tonnes of CO₂ and 145 tonnes of dust per year. Launching of the new plant enabled complete elimination of dust and sulphur compounds emissions. Carbon dioxide emission was reduced four times, while nitrogen oxides emission was decreased by 1 tonne per year. The investment contributed to the improvement of air quality in the city, as well as to the improvement of its citizens' wellbeing.

MORE INFORMATION

Geotermia Mazowiecka S.A.
9a Spółdzielcza str.; 96-320 Mszczonów
e-mail: geotermia@geotermia.com.pl
phone: +48 46 856 19 56