Klaipėda geothermal plant, Lithuania

Financing:

- Loan from the World Bank – 5.9 mill USD;
- Grant from the Global Environmental Facility (IBRD) – 6.9 mill USD;
- Lithuanian Republic State Budget – 14.28 mill LTL (appr. 4.14 mill €);
- Grant from Danish Environment Protection Agency – 15.7 mill LTL (appr. 4.55 mill €);
- EU Phare Programme – 4 mill LTL (1.16 mill €).

Contractors:

- NAFTA&GAZ COMPANY KRAKOW;
- AB "Geonafta";
- AB "Dzūkijos statyba";
- AB "Montuotojas";
- UAB "Klaipėdos inžinerinių tinklų statyba";
- AB "Lietuvos automatika".

Klaipėda Geothermal plant – general view

Operation:

Operation is based on closed circulation principle: deep pumps supply geothermal water from production wells (2G and 3G, 1135 m deep) of Devonian strata to the surface. Water passes filters and absorption heat pumps and returns to the deep layers through injection wells. High-pressure pumps (40 bars) are used to overcome deep pressure. Low potential heat (38^{o}C) is raised to higher temperature (70^{o}C) in absorption pumps operating on the second law of Thermodynamics with the supply of high parameters hot water (T=175^{o}C, P=10 bar). Produced heat is supplied to Klaipeda district heating network.

Technical data:

Designed capacity - 41 MW.
Total installed capacity – 35 MW:
13,6 MW from thermal water and
21,4 from the gas fired hot water boilers
Water temperature in production (extraction) wells 38^{o}C
Water temperature in injection wells 11^{o}C
Water glow rate 500-700 m^{3}/h
Wells depth 990-1100 m

Total heat generation 972,000 GJ/a.

Absorption heat pumps – front and side views

Installations:
The plant has 2 production wells and 2 injection wells; 4 absorption heat pumps with LiBr solution as heat absorbent working fluid (consist of a serial connection of 2 groups of heat pumps, 2 pumps in each group).
District heating water is heated in absorbers and collected in condensers. Evaporators are used for cooling geothermal water.
Hot water is being prepared in 3 hot water boilers (16,2 MW_{th} capacity each) and 2 heat exchangers.

Heat consumption from geothermal plant:
During heating season the plant supplies hot water to district heating network at the price of 46 LTL/MWh, during summer period the plant covers 70% of hot tap water (70^{o}C) demand for residents of Klaipeda City.

Environmental benefit:
Geothermal energy is clean energy, which avoids pollution of 52,000 t of CO_2 (carbon dioxide) and 270 t of NO_x (nitrogen oxides) per year, which would be emitted from substituted organic fuel.