

Freelance DCS Freelance warms up Szeged



During ancient time, the Romans and Turks used hot water springs to heat their baths and homes, and with time its use grew such that by the 19th century steam and hot water reservoirs beneath the earth's crust were being tapped for heating entire districts in cities.

Geothermal energy, literally translated as heat from the earth - is now emerging as a preferred energy source due its extremely low carbon footprint. Also, technological advances in process control and drilling have made it easier and more viable to harvest.

The advantages of Geothermal energy is that it can be harvested without burning any fossil fuel, thereby having practically no greenhouse gas emissions. Unlike solar and wind energy which are dependant on weather and sunlight hours, geothermal energy is available 365 days a year, 24 hours a day.

Wells several thousand meters deep are drilled beneath the earth's surface to tap the heat, and then, water is injected through the cracks made. A production facility is used to pump up the steam that is generated and a mechanical system delivers the heat directly for its intended use. Afterwards cooled water is re-injected into the ground to produce more steam. From drilling, injecting water, to pumping and distributing steam all procedures require high levels of precision, monitoring and control.

“ABB's proven pipeline management and monitoring system is providing us good overlook and remote monitoring on the district heating network. In the same time allow us to keep our operational cost low due to unmanned full autonomous control.”

Mr. Tamás Péter
General Manager
GEOSZ Kft.



Located in the Pannonian Basin, the city of Szeged is considered one of the most potential geothermal water sources in Hungary. In the year 2011, geothermal-sourced district heating was identified as the energy-efficient and cost-effective method for heating residential and government buildings in the city.



Image credit: Wikipedia

To use these resources for the new district heating system, Geothermal Services Ltd. company, decided to drill 2 wells (2,000 m each) along with 2 re-injection

wells (1700 m and 1250 m) deep into the geothermal reservoirs along with the pipeline network to provide a steady stream of hot water. Once commissioned these wells will heat up several large communal buildings including clinics, schools, colleges, libraries, and sport halls, etc. A tender was commissioned for the turnkey engineering and supply of automation, instrumentation and electrical scope for this project. After a long bidding process against other leading vendors, ABB's Process Automation team in Hungary was selected as the winner.

Phase 1 of the district heating system is in operation since November 2013, providing heat for 25 large municipal customer during the wintertime.

ABB's commitment to lower environmental impact
With years of experience and highest industry standards in harnessing renewable resources to reduce carbon footprint and lower environmental impact through advanced technologies, ABB offered a complete automation and control solution. Freelance - an easy to use, scalable distributed control system was at the core of the entire solution.

“This high-level Freelance monitoring system is enabling every user on the district heating network to follow all the data of their heating centers like water temperature, flow, consumed heat... real-time and also see the historical trends through the web.”

Mr. István Kiss
Senior System Engineer
ABB Hungary

Integration

A critical role in the automation of a geothermal plant is controlling and maintaining a steady supply of steam and water. To ensure this, information from a multitude of systems - from process control, Mbus-Profibus converter for thermal energy to power consumption - to name a few need, to be integrated.

Versatile communication and intuitive interface

With Freelance, integration of all common fieldbuses is possible with simple plug-and-produce concept. All relevant information is available in a single easy-to-use, reliable interface for engineering, commissioning, maintenance and fieldbus management. The intuitive operator interface enables easy operation, diagnostics and troubleshooting of the entire system.

The control system for the district heating plant also includes AC 800F controllers and more than 40 distributed remote I/O stations with S700 modules. While AC 800F offers a redundant, configurable system to adapt to the changing needs the plant by supporting upto 1,000 I/Os, S700 with its small footprint is used as a Profibus remote I/O.

The solution also comprises of central control room with multiple DigiVis operator stations. Supply, installation and commissioning of all associated motors and drives from 15 to 45 kilowatt (kW), that are used in the main pump stations as well as for the booster pumps circulating the hot water throughout the pipeline network. Besides these, there is also low-voltage main distribution boards and sub-distribution boards, electromagnetic flow meters along with the pressure and temperature field instruments.



Scope of supply

- 1 Freelance Control System with 2 AC 800F controllers and S700 remote I/O system, 1100 I/O signals
- 2 Engineering stations
- 2 Operator stations
- Redundant optical Profibus DP fieldbus network
- 16 Motors and 12 drives
- 2 Distribution and sub-distribution boards
- 6 Electromagnetic flow meters, 18 pressure transmitters, approximately 120 PT100
- 38 Thermo energy meter and transmitter
- 38 Power consumption meter, 14 motorized on-off valve, 45 motorized 3-way valve

Benefits

- Reduced environmental footprint with 4.4MW of renewable energy established
- Reduced operating cost with annual savings of 1.8 million cubic meter of natural gas
- 3.633 Ton annual greenhouse gas emission reduction with improved diagnostics due to integrated remote
- Enhanced operational productivity with 55.239 GJ annual renewable energy produced for heating

Watch news video clips on Szeged downtown cascade geothermal project [here](#) and [here](#).



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