Geo.Power Newsletter No. 1

www.geopower-i4c.eu

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Dear Readers,

we are glad to send you the first international newsletter of GEO.POWER, a brand new European project, coordinated by the Province of Ferrara, that groups together the most important practices experienced in nine EU Countries in the field of the low enthalpy geothermal energy and addresses long-term investments strategy for Ground Coupled Heat Pumps (GCHP).

The project was born from a simple assumption: geothermal energy is one of the most environmental-friendly and cost-effective energy resources in use and has the potential to help mitigate global warming if widely deployed in place of fossil fuel. Recent technological progress, the variability of the cost, the difficult of oil and gas supply, the need to reduce the use of fossil fuels to cut pollution have made the exploitation of geothermal energy, especially low-enthalpy power generation utilizing GCHP, an attractive and viable alternative.

Technological advances have dramatically expanded the range and size of viable resources, especially for applications such as home heating and cooling, opening a potential for widespread exploitation (e.g. GE application to curb energy consumption of industries and SMEs). Nevertheless, the EC highlights that this sector is not doing enough to exploit the potential of renewable energy sources, underlining that increased electricity and heat generation from geothermal resources will partially avoid the need for new fossil fuel-based plants. The main barrier to enhanced geothermal deployment is a lack of appropriate legislation and financial incentives on both EU and local level. Under the coordination of the Province of Ferrara, Italian leader in the filed of renewable energies (and, in particular, geothermal energy), the general objective of GEO.POWER, co-financed by the European Union in the frame of INTERREG IVC Programme, is to exchange best practices related to low enthalpy energy supply and – after a technical assessment on their potential of reproducibility - to produce an action plan for the large scale introduction of ground source heat pumps in each of the members regions, in close agreement with the Managing Authorities of European Structural Funds and with the support of the European Geothermal Energy Council.

Mauro Monti, Province of Ferrara -LP and Marco Meggiolaro, Project Coordinator

Study visit at Whiteknight Campus, University of Reading

The University of Reading has been involved in a number of topics relating to peak oil and the introduction of renewable energy sources via its annual Masters degree course. The new Student Services building is a good example of a modern public building illustrating current state of the art of UK building technology. It is highly insulated with under floor heating provided a ground source heat pump and a modern building management system which allows post occupancy evaluation. The partners of GEO.POWER project visited the installations in February 2011, in the frame of the international seminar "GCHP for public buildings: benefit, opportunities and new trends". During the event, almost 50 stakeholders and experts from all participating regions discussed over the best technical and economic options to trigger investments to switch to geothermal energy supply.

Showcase: GCHP for public buildings

CASE STUDY 1: AVENUE CENTER BUILDING, READING, UNITED KINGDOM

The ground source heat pump system was installed in a new shared-occupancy building comprising a special needs school and office accommodation. A combined installation of water-source heat pumps is linked to a ground-source heat installation supplies primary heat generation. These provide low cost, low maintenance and low CO_2 heat generation without any local pollution from the flue gases that would have been the case if boilers were used. They also provide summertime under floor cooling using borehole water via a plate heat exchanger for cooling. The installation comprises an array of 70 to 80m boreholes that accommodate the closed loop pipes in a conductive grout. These are connected to two heat pump units which extract the available heat and circulate it at a useful temperature through the building heating system.

CASE STUDY 2: GROUND SOURCE HEAT PUMP AT THE UNIVERSITY BUILDING OF THE POLYTECHNIC INST. OF SETÚBAL

EST Setúbal is an engineering school which belongs to the Polytechnic Institute of Setúbal. EST Setúbal was built in 1979. The floor that is being acclimatized with GSHP is a ground floor, which has 11 office rooms, 5 class rooms and one thermodynamic laboratory where the GSHPs are installed. The distribution system consists of fan-coils with two tubes with the supply/return temperatures of 7/12°C in summer, and 45/40°C in winter (http://www.est.ips.pt).

Geothermal heat pumps are an established and reliable technology which provides high quality indoor comfort. The result in energy savings is 30% compared to air cooled units. The lower CO_2 that is achieved contributes to environmental protection, sustainable energy development and it helps to fight the climate change.

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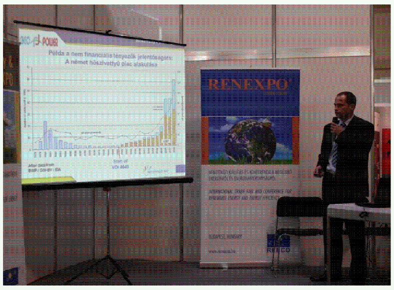
GEO.POWER presented at RENEXPO Central Europe Conference 2011



The Energy Centre Nonprofit Limited Company, the Hungarian partner of the GEO.POWER project, had the pleasure to inform interested stakeholders about the progress of GEO.POWER project at the *International Trade Fair and Conference for Renewable Energy and Energy Efficiency*. Energy Centre was present at the event with a presentation and a stand.

Tamás Simon the project manager of the GEO.POWER project first gave an overview on the Hungarian energy sector and on the future EU requirements. As the title of his presentation indicated – Hungarian heat pump sector and introducing the GEO.POWER project – he made the audience familiar with the GEO.POWER project. He explained the purpose of the project and the goals that it intends to achieve. At the end of the presentation a few Best Practice project examples was demonstrated.

Showcase: GCHP for public buildings

CASE STUDY 3: Ground source heat pump with borehole thermal energy storage (BTES) at headquarters INFRAX, VITO (Belgium)

The project concerns a very sustainable office project with several eco-innovative technologies. The project won several prices in Belgium and abroad (Challenge 2020, Green Good Design Award, etc.). This project comprises an active double skin with integrated photo-voltaic elements, slab heating and cooling and a ground coupled heat pump of 160 kW combined with a BTES system (24 vertical heat exchangers 130 meters deep). It provides an optimal example of Trias Energetica. At first, building skin is constructed in order to avoid heating in winter and cooling in summer, secondly the remaining energy demand is covered by a very efficient renewable energy system and at last the energy peak is covered in a traditional way.

CASE STUDY 4: Ground source heat pumps for public housing (Sweden)

Ground source heat pumps are very common in the housing sector in Sweden. Most ground source heat pumps are used with borehole heat exchangers, ranging from small houses with one borehole to larger multi dwelling houses requiring several boreholes. The latter is an increasing market. The boreholes are typical 100-200 meters deep. Key figures are: 300 000 installed ground source systems and in particular : borehole heat exchanger 70%; shallow ground heat exchanger 25%; ground water heat pump 5% and 10-12% of the residential heating in Sweden; reduces the usage of fossil fuel (oil) by 1,2-1,5 million m³/year; reduces CO_2 emission with 2,5-3,0 million ton/year .The market success is a result of a technology procurement in 1994-1995 by the Swedish National Board for Technical Development (NUTEK) on heat pumps. There were two winners in this procurement and both were ground-source units. As a consequence of the procurement, this type of heat pump began to dominate the market.

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Study visit at Sapareva Bania district heating system

Under the organization of the Ministry of Regional Development and Public Work of Bulgaria, partner of GEO.POWER project, GEO.POWER's member visited in April 2011 the Municipality of Sapareva Bania, known for the hottest geothermal springs in Bulgaria with a temperature of 100C°. The warm mineral water in Sapareva Bania is used for conservatory production development. Two schools, two administrative buildings (including the municipality building), a medical centre and the kindergarten are being heated with mineral water. The municipality has also developed a project for building a local geothermal plant which will supply the heating net of the buildings in the town and will replace the oil heating system.

Showcase: GCHP for private building and cross-cutting fields

CASE STUDY 1: ARLANDA AIRPORT, SWEDEN

The world largest energy storage unit – the aquifer that supplies space cooling and heating for Stockholm-Arlanda Airport – has been in service since the summer of 2009. From now on, all cooling of airport buildings, including the terminals, will come from the aquifer. Arlanda consumes as much energy as a city of 25,000 people. Areas as large as one hundred European football pitches need to be cooled in summer and warmed in winter. During the summer, the aquifer supplies cooling to Stockholm-Arlanda buildings while at the same time storing heat. In the winter, this stored heat will be used in the ground heating system at the airport, aircraft parking stands and to pre-heat ventilation air in buildings. The aquifer will reduce the airport annual electricity consumption by 4 GWh (no longer needed for operation of electrical chillers) and its district heating consumption by around 15 GWh making a total of 19 GWh. The system efficiency is world class. No heat pumps are used and electrical chillies less than 100 hours per year, give a SPF closer to 100.

CASE STUDY 2: TELENOR, ENERGY CENTRE, BUDAPEST, HUNGARY

The green-field construction of the new TELENOR headquarters began in summer 2007 and has been operating since 31.10.2008. When designing its new premises TELENOR was driven by its environmental commitment making it one of Hungary's most environmentally friendly businesses. The building is equipped with environmentally-friendly engineering technology, based on renewable energy sources. The building draws its energy from geothermal heat pumps. The system uses 180 Borehole Heat Exchanger (BHE) drilled 100 meters deep (diameter 40 mm) in order to provide cold and hot water, therein regulating temperature in the building. The energy efficiency of the building is controlled by an intelligent building management system that allows efficient measurement and control of various equipment parameters.

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Save the date!

Next GEO.POWER workshops in Ferrara (Italy)

From the 28th to the 30th of September 2011 GEO.POWER will organize an intensive two days workshop in Ferrara (Italy). These events, organized alongside the »GeoThermExpo« one of the most important exposition in Italy concerning geothermal energy, will focus on the best financial and normative schemes currently existing in Europe that support the introduction of GCHP in public and private sector. During the event, project partners will also discuss the methodology to measure the transferability of GCHP technologies among the concerned project areas, which is one of the core topic of capitalization project in INTERREG IVC Programme.

Showcase: GCHP for private building and cross-cutting fields

CASE STUDY 3: CASAGLIA, PROVINCE OF FERRARA, ITALY

After the energy crisis in the 70s, the Municipality of Ferrara launched the "Geothermal Project" in order to exploit the geothermal resource as a primary source for an urban heating system. At first, the geothermal fluid (hot water at 100°C) is pumped from depths of 1.000 m to the surface; then the hot water transfers thermal energy to the heating system. Finally, it is re-introduced in the ground in order to ensure the geotechnical stability. Now, the network in Ferrara is fed by the so-called "Integrated Energy System" in which the energy from the Waste Treatment Plant (WTE, Waste To Energy) has been added to the geothermal source. This example is interesting because it combines medium-enthalpy geothermal source with the energy from the Waste Treatment Plant. Actually, a workgroup composed by HERA, the University of Ferrara, the Emilia-Romagna Region and the Province of Ferrara, is studying the prospects of enhancing the system with a new geothermal source and the and the application of aquifer thermal energy storage (ATES) techniques.

CASE STUDY 4: HOTEL AMALIA, GREECE

Hotel "Amalia" with a total area of 8,980 m^2 is located in Nea Tirintha near Nauplio in Peloponese, Greece. The building was totally renovated during the years 2007-2008 and is heated and cooled by an open-loop heat pump system. After two years of operation (2008-2009) the adopted technological choices in the Hotel "Amalia" have allowed important energy and economical savings. Compared to a conventional system, the geothermal system offers 70.5% energy saving and 67.4% cost saving. In addition, the total CO_2 savings are 323,328 kg CO_2. According to the calculations, simple pay-back time is estimated to 4.68 years with a system lifespan of 30 years. The expected SPF (heating) is 4.54, while the expected SEER (cooling) is 3.65. The results have been positive in all respects: the operating cost, the required maintenance, the total independence from traditional fuels and the operation continuity.

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PARTNERSHIP

Province of Ferrara - LEAD PARTNER

ΚΑΠΕ
CRES

Centre for Renewable Energy Sources and Saving (CRES), Greece

Ministry of Regional Development and Public Works

ENEREA Eszak-Alfold Regional Energy Agency, Hungary

'Energy Center' Energy Efficiency, Environment and Energy Information Agency Non-profit Limited Company, Hungary

Institute of Geology at Tallinn University of Technology, Estonia

vito
vision on technology

VITO Flemish Institute for Technological Research

Reading
BOROUGH COUNCIL

KTH
VETENSKAP OCH KONST

Department of Energy Technology, Royal Institute of Science (KTH), Sweden

SP Technical Research Institute of Sweden

Regione Emilia-Romagna

GeoZS

Geological Survey of Slovenia

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