

THE GEOTHERMAL ASSOCIATION OF IRELAND

Newsletter

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Introduction

Dear Members,
 Welcome to the 5th edition of the Geothermal Association of Ireland Newsletter. We hope you find this edition informative and we invite feedback from you, particularly follow-up articles and suggestions for future editions.
 The GAI wishes all its members a peaceful Christmas and New Year!

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House of Tomorrow

The Irish Energy Centre has recently launched an Energy Programme which offers financial support for sustainable housing schemes (both newly built and refurbished houses in the public and private sectors). Its aim is to encourage more sustainable energy performance in Irish housing.

The Programme is divided into 8 categories with a total budget of 21.1. M Euro over the next 5 years. For example Category 1 involves the 'Design and Construction' of up to 1000 new homes in the social housing sector nationwide demonstrating Best Available energy practices. Funding is in the range of 40-50% of the approved estimated additional costs arising, subject to an indicative limit of 2,500 Euro per dwelling for Category 1. Other categories also provide opportunities to avail of funding.

The Geothermal Association of Ireland encourages installers and promoters of energy efficient 'Geothermal Heat Pumps' to explore this funding avenue.

For further information contact your Local Energy Agency who can assist in the drawing up of suitable proposals free of charge.

The Geothermal Association of Ireland was formed in January 1998. The mission of the Association is to promote the development of Geothermal Resources in Ireland and to represent the interests of its members. The Officers are: Mr Bob Aldwell (Chairman), Mr. Michael O'Brien (Vice Chairman), Mr Pat Walsh (Secretary), Mr. Seamus Hoyne (Treasurer), Mr Brian P. Connor (European Projects Officer), Prof. Peter Brück (Development Officer).

Site Visit — Castletownroche.

Staff of Cork County Energy Office recently visited Ballygriggan House, the home of Michael and Mary Rose Cooney, to view the installation of a Geothermal Heat Pump system.

Ballygriggan House is located close to Annesgrove Estate in Castletownroche, Co. Cork and is currently undergoing major refurbishment and extension.



The heat pump system comprises 1200m pipe laid over an area of 320 m² (32m x 10m) in the garden (see above). The Cooney's had to use a rock breaker to excavate the ground to a depth of > 1m.

The existing 3 bedrooms and kitchen are heated by oil fired central heating. It is intended that the geothermal heat pump used in conjunction with underfloor heating will heat 70% of the house.

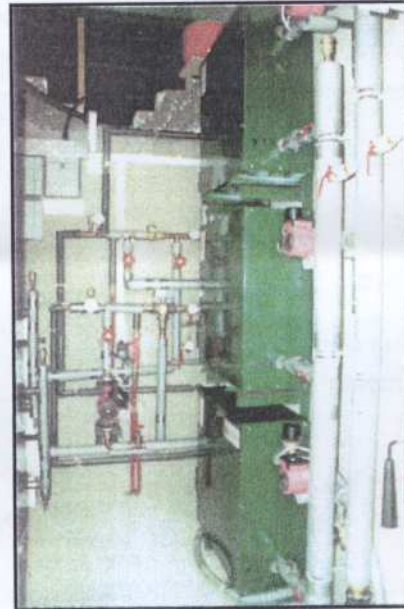
The underfloor heating system is being installed both upstairs and downstairs. Wooden floors will be laid upstairs in a sandwich effect - a space between two oak layers. This allows for expansion and contraction of the wood during heating. Porcelain tiles will be laid downstairs. The total floor area to be heated by Geothermal Energy is approximately 2500m².

GAI Site Visits in 2001

Two site visits in West Cork were organised for GAI members on May 8th 2001.

1) Kental Systems Ltd.

Mr. Jim Tangney, Director, conducted an excellent tour of the factory and explained how Geothermal Heat Pumps operate, the various combinations that can be used and showed a working model of a heat pump. Mr. Tangney also explained 'air to air' heat pumps and new developments in electric storage heating systems in which Kental Systems have been involved. Clearly Kental Systems are involved in innovative work and the site visit was very interesting and useful.



Geothermal Heat Pump, (commercial scale)

2) Dunstar Ltd.

The Headquarters of Dunstar Ltd, which is located in Kent St, Clonakilty was the focus of our second visit where we met with the staff and were given a tour of their offices. We were then given an explanation of the various geothermal projects that are currently being undertaken by Dunstar Ltd. This site visit was a good follow-up to the presentation given by Mr. Paul Sikora, Director at last years AGM in Thurles.

'Meeting of the Commission of Mineral and Thermal Water'

The 'Meeting of the Commission on Mineral and Thermal Water' took place at Se-stroresk Spa, located approx. 25 km northwest of St. Petersburg on 24th—30th September 2001. The Geothermal Association of Ireland, was represented by Professor Peter Brück.

The following outlines a brief overview of the Meeting. Prof. Brück's detailed report on the visit can be obtained from the Secretary of GAI.

Tuesday 25th Sept: The delegates were welcomed by Prof. Voronov of the University of St. Petersburg who proceeded to talk about '*Mineral and Thermal Groundwater Resources of the Platform Artesian Basins of Russia*'. In this session also, a talk was given on '*Thermal Waters in the Polish Part of the Sudet Region: Occurrence, Origin, Exploration Prospects*'. This session was followed by an excursion around Sesrtoresky Spa, where delegates were shown boreholes as well as various treatment rooms.

Wednesday 26th Sept: Talks of interest to Ireland included: '*The Origin of Mineralised Waters in Flysch Formations of the Central Carpathian Synclinorium, Central Poland*'. As in Ireland, the bulk of warm waters in Poland originate in the Carboniferous, (although in sandstones rather than in limestones as here), they come to the surface along faults. Also of interest was the talk given on '*Research of the Origin of the Deep Geothermal Water of the Bordeaux syncline*'. Deep geothermal boreholes used for space heating have been drilled in Bordeaux and research indicates that these waters come from various horizons ranging from Palaeozoic to Mesozoic in age.

Thursday 27th Sept: Visit to the Hydrogeology Dept of the Geology Faculty of St. Petersburg State University. Unlike Ireland, this University offers full undergraduate courses in Hydrogeology.

Friday 28th Sept: Prof Brück presented a talk on '*Geothermal Research in Ireland*'. The aims of the GAI were discussed, followed by an outline of Ireland's geothermal resources, ongoing projects and the application of heat pumps in Ireland. This talk generated much interest among attendees some of whom suggested future collaboration with GAI.

A field trip around the Karelian Isthmus afforded delegates an opportunity to visit Be-loostrov water intake where water is supplied from a gravel aquifer and is then used for bottling. This area is an important health resort with abundant lakes, rivers and springs. There are very high levels of iron and barium in the groundwater due to the underlying geology (boundary of Baltic crystalline shield and the Russian platform).

Saturday 29th Sept: The location of next years meeting was set for Slovenia and will be organised by the EON Research Center.

The GAI would like to thank the Irish Energy Centre and Dunstar Ltd. for generously sponsoring the cost of this trip.

Enercret Thermo-Active Foundations

This article outlines the application of Enercret technology, the concept of which was introduced to readers in Edition 4 of the GAI newsletter.

"Concrete structures such as piles, diaphragm walls, retaining walls, foundation slabs etc. are used to absorb thermal energy from the ground and groundwater. The energy is absorbed and transported by means of fluid filled pipe systems incorporated inside the foundation elements.

A building can be cooled for next to nothing by using the cooled fluid. In the case of heating, the same system can be used to extract energy by means of a heat pump. The ground provides an intermediate storage facility for excess energy—the warmth disposed during the cooling period can be absorbed for heating and vice versa.

In the new office of ADEME in Angers (investigated as part of this study), Enercret provides energy savings of 71%, carbon dioxide emissions of almost zero, and a payback period of 4.71 years.

Project Data

Pile—foundation: 136 piles, 70cm dia and 10m length.

Absorber Piping: 8 pipes in each pile, 80m total piping in each pile. Two piles connected to one loop plus 90m connecting pip to manifold.

Soil Conditions: Alluvium

Floor Area of Building: 1200 m².

From "Geothermal Cooling and Heating using Enercret Thermo-Active Foundations Project study, New Office Building, Ademe-Angers, France".

By Mr. Robert Ferrari for the Altener Conference, Toulouse, 23-25th October 2000.

Geothermal Energy Development Eastern Macedonia

The region of Kavala is situated in the Eastern Macedonia. The geothermal field of Eratino-Chrisoupoli is in this province and covers an area of approximately 40km².

In 1983, 14 exploration holes were drilled in the region by the Institute for Geological and Mineralogical Exploration. The results of this drilling indicated that a geothermal aquifer exists at great depths.

In 1997, the Institute drilled two more productive wells with a total artesian flow of 150 m³/h. Their studies indicate that the geothermal aquifer of Eratino-Chrisoupoli is located at a depth of greater than 500m. At a depth of between 550 and 650m the temperature is approximately 72°C. The geothermal fluids are not suitable for direct use in agricultural applications due to high conductivity.

This Altener funded project is a follow-up to these earlier studies in the Eratino-Chrisoupoli field. The project aims are to:

- ♦ Carry out a feasibility study to assess financing and implementation of geothermal exploitation in this area.
- ♦ Develop an economical exploitation model.
- ♦ Disseminate ideas on Geothermal development in Eratino-Chrisoupoli to farmers and local investors.

The main thermal applications examined in this study are greenhouse heating, district heating and crop drying.

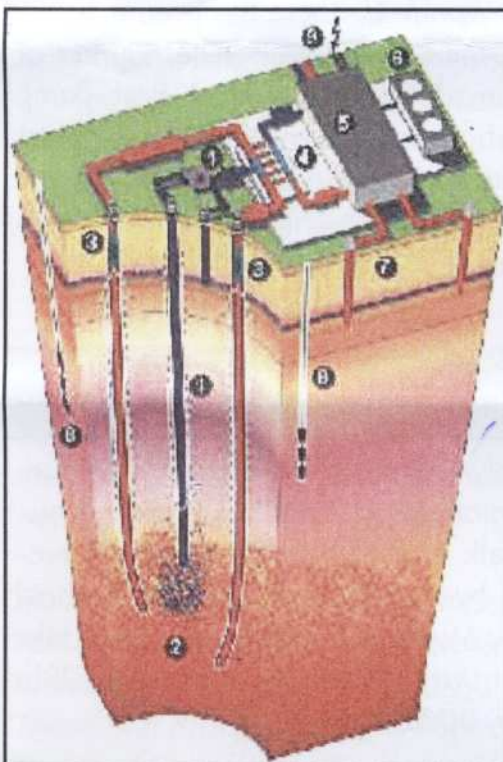
From "Geothermal Energy Developments in the prefecture of Kavala—A local plan".

By G. Kanavakis, A Chatziathanasiou, M. Nikolae. For Altener 2000 Conference.

The Hot Dry Rock System (HDR)

The principle of HDR is the extraction of energy from hot artificially-fractured rocks at depths of 3 km and more. A pair of wells is drilled into the rock, terminating several hundred meters apart. Water is circulated down the injection well and through the HDR reservoir, which acts as a heat exchanger. The fluid then returns to the surface through the production well, and thus transfers the heat to the surface as steam or hot water.

It is, in principle, a simple concept, however in practice, experimental results have revealed that artificially induced circulation is often hard to sustain without major loss of water. Nevertheless more promising results have recently been observed from European studies.



1. Injection Drill Hole and Injection Pumps
2. Stimulated Joint System
3. Production Drill Holes
4. Heat Exchanger
5. Turbines and Generators
6. Cooling Cycle
7. High Temperature Underground Storage
8. Seismic Monitoring Drill Holes
9. Consumers of Electricity and Heat

Brief comparison between HDR and Geothermal Aquifers

Geothermal aquifers should not be confused with hot dry rock reservoirs.

In HDR technology, permeability has to be artificially enhanced and water has to be introduced into the rock from the surface.

In contrast, geothermal aquifers have a natural porosity, and are sufficiently permeable to allow the water simply to be pumped out.

Both systems can be exploited for electricity generation and direct heat use.

Environmental impact

Geothermal aquifers and HDR systems can be almost pollution-free sources of energy. Gaseous emissions are usually negligible and noise is only a problem during borehole drilling.

Conclusion

These advances in technology increase the potential of geothermal energy enormously. However, we have far from exploited this clean and renewable form of energy. Therefore all of these resources should be properly evaluated and developed since there is enough heat stored in the earth's interior to cover the total energy demand of humankind over the rest of the lifetime of the biosphere..

For further information contact www.geothermie.de/egec_geothernet

Geothermal Energy Utilisation - World and European Overview

Overview worldwide

World generating capacity from geothermal resources is now in excess of 8000 Mwe—up by 1423 MW compared with 1995, and expected to reach over 11,000 Mwe by 2005. The power generated from geothermal sources in 2000 was almost 50 TWh—less than 0.25% of the world potential if the latest technologies are used according to recent estimates by experts at the International Geothermal Association.

Electric Power Generation

In the year 2000 a total of 49,261.45 GWh of electricity was generated from geothermal resources, with a total of 7974 MWe installed, which is an increase of 1141 Mwe since 1995.

Direct Heat Utilisation

58 countries now utilise their geothermal fluids in direct applications, for installed thermal capacity of 15,145 MWt, and an estimated thermal energy use of 190,699TJ per year.

Focus on Geothermal Use in Europe

More recently, extensive direct heat utilisation projects have been undertaken in many central European countries, and in Italy and Iceland. Geothermal heat pumps have come into their own in Austria, Switzerland, Germany and Sweden.

Electricity generation:

Only four countries, Turkey, Portugal (Azores), Italy and Iceland have produced substantial electric power from geothermal energy. Romania has an experimental binary unit at the University of Oradea.

Austria has installed a 240 kW binary unit at Altheim, and Greece at one time had a small generator on Milos (2Mwe). France and Russia have plants outside of Europe (Guadeloupe and Kamchatka). The electric installed power is only 13% of the world total, and the energy produced is only 12%, reflecting the low availability of high-temperature resources in Europe.

Heat Pumps

Regarding the use of groundwater heat pumps *worldwide* there has been a boom during the last few years. The number of geothermal (ground source) heat pump installations has grown by 59%, with most of them in the USA and Europe. At the moment there are at least 500,000 units installed in 26 countries.

Cork Geological Association

Monthly lectures are hosted by the Cork Geological Association. The title for January's talk is 'Meteorites' and will be presented by Ms. Ita Mullane of the Natural History Museum, London. It is due to take place in Jury's Hotel on Wednesday 28th January 2002 at 8pm.

The following lecture 'Distance to the Moon in the Geological Past' will take place on February 27th, at Jury's Hotel at 8pm. This talk will be presented by Mr. Paul Dowdall, Geology Dept. U.C.C.

Several field trips will also take place in the coming year to locations such as White Bay and Mitchelstown Caves.

For more information about CGA, please contact Dr. Bettie Higgs at 021 4902117.

Proceedings of "International Course on Geothermal Energy 2001"

A number of workshops and courses on Geothermal Energy were held in Bad Urach, Germany in September 2001 by the International Summer School on Direct Application of Geothermal Energy. The Organising Committee comprises members from the EGEC (European Geothermal Energy Council), the IGA (International Geothermal Association), ISS (International School of Direct Application of Geothermal Energy of IGA) and many more European Geothermal Associations.

The proceedings of this conference provides an excellent overview of Geothermal Energy applications in Europe. The Proceedings comprise 26 papers on 3 main topics:

1. Direct applications of Geothermal Energy for Balneology and Water Tourist Centres.
2. Geothermal Heat Pumps
3. Hot Dry Rock Technology

The following outlines the list of talks presented at the Course on Geothermal Heat Pumps:

"Shallow Geothermal Energy" by B. Scanner.

"Status and Prospects of Geothermal Heat Pumps (GHP's) in Europe and Worldwide: Sustainability Aspects of GHP's" by L. Rybach.

"Theoretical Background" by K. Popovski.

"Design of Closed Loop Geothermal Heat Exchangers in the U.S." by M. Reuss & B. Scanner.

"Groundwater as a Heat Source for Geothermal Heat Pumps" by B. Drijver & A. Willemssen".

"Ground Source Heat Pumps in the Residential Sector in France" by C. Olivier.

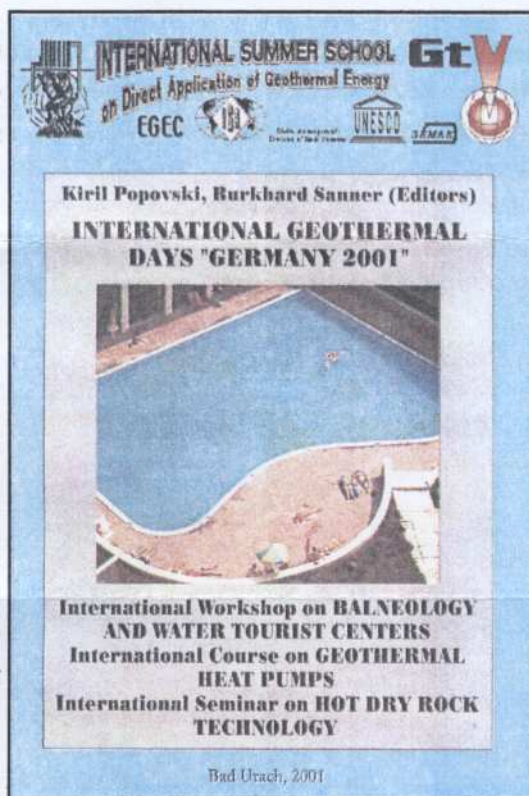
"The Economics of Heat Pump Systems for Commercial and Institutional buildings" by R. Gordon Bloomquist.

"Earth Energy in the U.K.". By R. Curtis.

If you wish to obtain a copy of the Proceedings, contact:

"International Summer School on Direct Application of Geothermal Energy".

Tel: +389 2 119 686



John Dunne remembered...

All who are involved in groundwater issues in Ireland will have known of the late John Dunne, well driller. As John Dunne's second anniversary approaches on January 22nd, the Geothermal Association of Ireland remember one its most active members. Dr. Bettie Higgs, Geology Department, U.C.C. recounts below her memories of the much liked and respected John Dunne.

"I met John at the first evening class of the first diploma in geology class, over 10 years ago. Little did I know what I was in for! He positioned himself modestly in the back row, but if anyone thought he would be out of sight and out of mind, they were very much mistaken. Larger than life, and always ready for fun, John very soon established himself as the life and soul of the class. We were in for still more surprises on our first weekend fieldtrip to Dun An Ór, Dingle Peninsula, when we discovered his singing talent. Along with a few other talented class members he provided the best session I can remember.

But along with the fun, John was very focused, and took his geology seriously. Although in his own words, he had not studied for a long time, his enthusiasm carried him through, and his work was characterised by an excellent presentation on his beloved groundwater. Indeed his long geological experience proved beneficial to his own, and subsequent classes, for example on visits to the Spa House in Mallow, to observe geothermal waters.



(L-R) Prof. Brück, Dr. J. Kinnaird, J. Dunne, Dr. B. Higgs, Dr. K. Higgs.

John gained his diploma in Geology in 1992 and subsequently became a founding member and great supporter of the Cork Geological Association. He introduced me to the world of water well drilling - an increasingly important occupation - but most of all I appreciate the way in which he made my task of organizing classes an enjoyable and rewarding one.

In the geological world, John treated amateurs and professionals alike. He was respected by both for his down to earth and practical approach, and will long be remembered for the colour he brought into their worlds".

Bettie Higgs.

Your Views

If you wish to contribute an article/feature etc. to this Newsletter we would be delighted to hear from you. Subject matter we hope to cover would involve both National and International aspects of Geothermal Development as well as creating a forum for interested parties. Please send your views and articles to:

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