

# THE GEOTHERMAL ASSOCIATION OF IRELAND

## Newsletter

Secretariat: Energy Agency Office, Spa House, Mallow, Co. Cork  
 Telephone: 022 43610 Fax: 022 43678 Email: mallowre@indigo.ie

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INTRODUCTION	CONTENTS OF THIS ISSUE
<p>Dear readers,            Welcome to the 4<sup>th</sup> edition of the Geothermal Association of Ireland Newsletter. We hope you find this publication interesting and look forward to receiving any feedback you can offer. Our intention is to provide you with information on related topics and forthcoming events.</p>	<ul style="list-style-type: none"> <li>◆ Summary of G.A.I. Officers meeting, September 2000</li> <li>◆ A Geothermal Europe – The Ferrara Declaration</li> <li>◆ Geothermal Heat Pumps – How they work</li> <li>◆ Submission to the Irish Energy Centre</li> <li>◆ Enercret – Concrete Absorber Technology</li> <li>◆ Development of Deep Geothermal Water</li> <li>◆ Cork Geological Association</li> <li>◆ Time to Look Again at Geothermal Energy Development In Ireland</li> <li>◆ Warm Springs Model for Munster</li> </ul>
SOME POINTS OF INTEREST	
<ul style="list-style-type: none"> <li>◆ 3rd Seminar on ‘<b>The Role of Geothermal Energy in Sustainable Development of Mazowsze and Lodz Regions of Poland</b>’. 19th-21st October 2000, <i>Skierniewice, Radziejowice, Poland.</i></li> <li>◆ <b>Renewable Energy Seminar, Toulouse, France.</b> 25th-28th October 2000.</li> </ul>	

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 Shane O’Neill (Public Relations Officer), Mr Brian P. Connor (European Projects Officer), Prof. Peter Brück (Development Officer).

## SUMMARY OF G.A.I OFFICERS MEETING

**Venue:** Lord Mayors Pavilion, Fitzgeralds Park, Cork.

**Time/Date** 3:30 pm, Wednesday, 13<sup>th</sup> September 2000,

### Summary of Meeting

- ◆ Simone Deirenger has recently been taken on by Mallow Energy Office through the EVS Programme. Simone is now working part-time for GAI, which is seen as a positive step for the Association.
- ◆ Pat Walsh reported that less than half have paid their subscription fees for 1999, (1998 fees were complimentary). If subscription fees are not received after reminders, correspondence to non-paying members will have to cease.
- ◆ Subscription fees for 2000 have increased to £30 for individual membership and to £60 for corporate membership.
- ◆ A seminar on geothermal energy will be held in conjunction with the AGM which will take place in the offices of TRBDI in Thurles in mid-November.



Photo of Officers with the Lord Mayor of Cork in the offices of Cork City Energy Agency.

## A GEOTHERMAL EUROPE - THE FERRARA DECLARATION

In April 1999, the European Geothermal Energy Council (EGEC) held a seminar in Ferrara, Italy, inviting the geothermal business community from all European countries. During the course of the two-day seminar, the current situation of geothermal energy was discussed by the participants, outlining the need for development, advancement and improvement.

As it stands, only a fraction of the potential geothermal energy has been explored and utilised in Europe. It is for this reason that the agreement was made to develop geothermal use to support a natural, sustainable and clean energy future in Europe and to direct this towards a number of targets.

“Targets for a geothermal energy development at the start of the new millennium”.

	1998	2010	2020
Heat*	920,000 dwellings 5,200MW <sub>th</sub>	3,000,000 dwellings 15,000MW <sub>th</sub>	12,000,000 dwellings 48,000 MW <sub>th</sub>
Electricity**	940MW <sub>el</sub> 7,500GWh/y	2,000MW <sub>el</sub> 16,000 GWh/y	Without support: 3,000MW <sub>el</sub> 24,000GWh/y ecologically drive: 8,000MW <sub>el</sub> 64,000 GWh/y

\* deep and shallow resources

\*\* incl. engineered geothermal systems

To achieve these targets, all sectors including politics, science and business need to collaborate their efforts. An appeal was made to all decision-makers, leaders in politics and economy, national government and parliament in Europe, the European Commission and to all the members of the European Parliament to support and to help achieve targets. In particular, seeking:

- Support for geothermal energy research, development, demonstration, market development, information dissemination etc., and support within the 5<sup>th</sup> framework programme of the EC;
- Creation of a political and public environment and market conditions favourable for geothermal energy;
- Support in dissemination of information on geothermal use on various levels, from decision-makers to potential customers and the public;
- Support for the export of European geothermal technology.

The advantages of increasing the use of geothermal energy will undoubtedly contribute to:

- Reduction in CO<sub>2</sub> emissions;
- Saving of primary energy;
- The creation and sustaining of work places on various skill levels.

The board of directors and members of EGEC and other participants concluded that all possible efforts would be made to advance goals, promote geothermal use at all levels and contribute to implement a sustainable energy supply.

## GEOHERMAL HEAT PUMPS - HOW THEY WORK

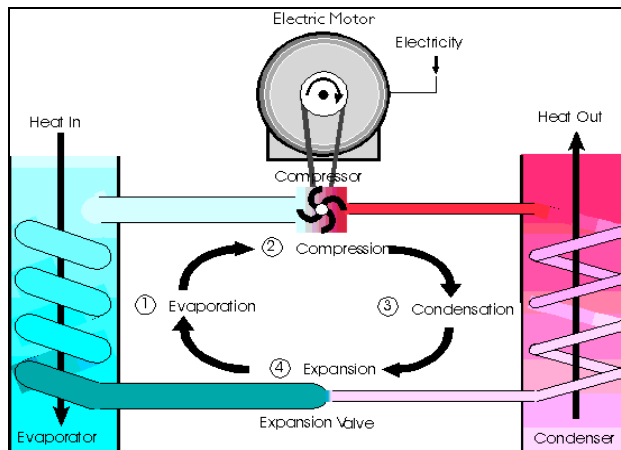
### Introduction

Constant heat discharge from the Earth's core and solar energy stored in the ground allows an abundant and secure source of thermal energy to be present in the Earth's crust at relatively constant temperatures throughout the year. This interior heat can be used by extracting heat from hot water or rocks using geothermal heat pumps. More than 90 of these ground source heat pumps have already been installed in Ireland and are being used for space heating/cooling and water heating. Installation of heat pumps in Europe has been relatively slow in comparison to countries such as Japan and North America.

The heat pumps transfer heat from areas of lower temperature to higher temperature areas, and vice versa. By doing this, the heat pump can act not only as a heater but also as a dehumidifier and cooler (like refrigerators and air conditioners). Heat being moved between the ground and buildings can be achieved, for example, by using soil heat pumps, which extract heat from the overburden at depths of approximately 1m. Bedrock heat pumps have their piping situated much deeper in the ground, with drilled holes ranging from about 32 to 180 m in depth.

### Technology

There are a number of different types of heat pump. The closed cycle system is described below.



*'Closed cycle, electric- motor-driven vapour compression heat pump'*

In a closed system, cold liquid refrigerant passes through a heat exchanger (evaporator) and absorbs heat in the ground loop. The refrigerant then evaporates into a gas and the heat is absorbed. The gaseous refrigerant passes through a compressor where it is pressurized, raising its temperature to over 190°F. Hot gas then circulates through a refrigerant-to-air heat exchanger (condenser) where heat is removed and pumped into the home at about 100°F. When the heat is lost, the refrigerant changes back to a liquid. This is cooled as it passes through the expansion valve and begins the cycle again. To operate an air conditioner, the flow is reversed.



An example of this technology is the 'Markus' heat pump (manufactured in Sweden). This product is environmentally friendly and cost effective, with possible savings of up to 50% to be made on the heating costs of average sized houses. The 'Markus 2500 Kombi' was developed for houses with electric heating. A small water-borne heating system is used and can be connected to under-floor heating, fan convectors or water filled radiators. The water borne heating system gives off two thirds of the heat and the remainder is given off by the heat pump to the surrounding air. Information on this product can be obtained from: *IMS Heating Solutions Limited, Arran House Business Centre, Arran Road, Perth, Scotland PH13DZ Tel: 01738 580581.*

'Markus 2500 Kombi'

**Author: Orla Freyne**

<p style="text-align: center;"><b>SUBMISSION TO IRISH ENERGY CENTRE</b></p>	<p style="text-align: center;"><b>ENERCRET - CONCRETE ABSORBER TECHNOLOGY</b></p>						
<p>Following an expression of interest in organisational and professional development from the finance and contracts manager of the Irish Energy Centre, Dublin, a proposal by Shane O' Neill, the Public Relations Officer of the Geothermal Association of Ireland (GAI), was submitted. He advised that the Association through its members, will be in a position to provide technical skills and knowledge transfer in the areas of geothermal energy.</p> <p>The GAI was established approximately three years ago under the auspices of the Energy Agency Office, Spa House, Mallow, Co. Cork.</p> <p>Members of this organisation are mainly geologists, hydrologists and engineers. A sizeable proportion of these were involved in the investigation of geothermal energy in Ireland during the late 1970's and 1980's.</p> <p>Some members were involved in developing the geothermal potential in Munster and others involved in the low enthalpy geothermal project based in Trinity College Dublin.</p> <p>Members of the Association were responsible for the development of groundwater as a source of heating for the public swimming pool in Mallow, Co. Cork, using the warm spring as a heat source for an electrical heat pump.</p> <p>Others were responsible for the development of groundwater as a source of energy for several buildings at the east-end of Trinity College.</p> <p>The Association is actively promoting environmentally friendly technology and the use of groundwater as a source of both heating and cooling, facilitating cost saving and convenience benefits.</p> <p><b>Shane O' Neill, P.R.O.</b></p>	<p>Brian P. Connor &amp; Associates Ltd were partners in a recently completed Altener project, the aim of which was to promote the use of Enercret (Concrete Absorber Technology). This E.U supported project, involves partners in Austria (Co-ordinator), France and Italy.</p> <p>Ground temperature at a depth of 10m has a constant temperature of 10° – 12°C. Using the foundation of large buildings, this heat can be used to heat the building and if necessary cool it – using heat pumps. This technology, called “Enercret” foundations was the topic of this Altener project and its object was to carry out the following:</p> <p><b>Technical Study</b> in Ireland (and also Italy and France) to identify the regions and buildings in which this technology could be utilised. The priority regions in Ireland were Dublin and Cork where deep piled foundations for buildings are often necessary.</p> <p><b>Marketing Study</b> to evaluate the market potential in Ireland.</p> <p>Heating and Consulting Engineers throughout the country, and in particular the priority areas were informed of the technology. <b>Realising of market opportunities</b> was achieved by appointing a contractor to promote and install the technology.</p> <p>The payback period of this technology varied from country to country, as follows:</p> <table border="0"> <tr> <td><b>Ireland</b></td> <td><b>8.53 years</b></td> </tr> <tr> <td><b>Italy</b></td> <td><b>3.15 years</b></td> </tr> <tr> <td><b>France</b></td> <td><b>2.08 years</b></td> </tr> </table> <p>This depends on two factors, energy prices and % use of cooling – the more cooling the shorter the pay back period.</p> <p>To date no realisation project has been developed in Ireland but some projects involving commercial buildings have been evaluated. The main competition in the recent past has been natural gas and the low percentage of cooling use in Irish buildings.</p> <p>The increasing cost of natural gas and the higher standard of comfort required in buildings will make Enercret a commercially attractive technology in the future in Ireland.</p> <p><b>Author: Brian P. Connor, European Projects Officer</b></p>	<b>Ireland</b>	<b>8.53 years</b>	<b>Italy</b>	<b>3.15 years</b>	<b>France</b>	<b>2.08 years</b>
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## DEVELOPMENT OF DEEP GEOTHERMAL WATER

Shallow geothermal resources have been developed in Ireland for the past few years and new projects, both for single houses and commercial buildings continue to be installed. Within the country there is now the necessary expertise for installation of this technology but this expertise must be further disseminated.

Deep geothermal water i.e. waters at temperatures above 50°C and at depths up to 2Km below ground-level have not been developed. This has led to a total lack of practical expertise of the technologies involved which also hinders the development of the resources. The author, through various E.U. supported geothermal projects has had some of the continental experts in deep geothermal energy in Ireland. They are of the opinion that it is possible that such resources exist and in sufficient volume to support practical developments in District Heating and associated Spa and Horticultural activities.

The possibility of funding for the exploration and development of deep geothermal water was discussed last year in Brussels with some of the European Commission Scientific Officers in DG12 and DG17. There would appear to be no possibility of obtaining any funding from E.U. as they considered that there was no new or innovative technology involved that they could support ie. new in an European Context.

It would appear that funding to carry out a national study of our deep geothermal resource will have to be obtained locally in Ireland. The requirement to establish the national resources of deep geothermal water is as follows:

1. A national survey to locate the deep geothermal aquifers.

2. A drilling programme.

The national survey could cost in the region of £100,000 to £150,000.

The second phase of exploration i.e. the drilling of exploration wells would cost approximately £1,000,000 per well.

The initial study would probably have to be funded by national funds. Exploration drilling could be a mix of private and public funds, i.e. A national fund could be provided to support the drilling of exploration wells. A percentage grant could be provided for each well, which would have to be repaid in the event of the well being successful. This rolling fund would be the best value for the national fund.

### CONCLUSION

The development of deep geothermal water in Ireland would have many benefits – new renewable heating source, development of Spa tourism industry, reversing rural decline & further development of horticultural industry etc.

**Author: Brian P. Connor**

## CORK GEOLOGICAL ASSOCIATION

⇒ Monthly lectures are hosted by the Cork Geological Association. The title for September's talk is:

***'Satellite Remote Sensing – The Earth from a Distance'***.

It is due to take place in Jury's Hotel on Wednesday 20th September 2000, at 8 p.m.

⇒ 'The Association will also be holding a meeting on Friday 10th November 2000, at Inniscarra Waterworks & Power-station which will commence at 9.30 p.m.

## TIME TO LOOK AGAIN AT GEOTHERMAL ENERGY DEVELOPMENT IN IRELAND

Once again the great dependence of modern society on energy has forcefully been brought to everyone's attention. The heavy reliance on imported oil of the EU countries has stimulated a major internal debate regarding the appropriate and sustainable levels of price, taxation rates and the environmental cost of imported fossil fuels. In contrast, during periods of low oil prices public interest lessens about reducing energy waste and developing alternative energies.

The 1973 oil crisis prompted a major drive to seek alternative energy sources. In countries such as France, rapid development of low temperature geothermal energy took place. In the 1980's, Ireland with EC support undertook an initial survey of the country's geothermal potential. The results showed that Ireland possesses large quantities of low temperature (10oC to 24oC) geothermal and groundwater energy. Efforts to locate deep warmer water were confined to sinking a small number of 500m boreholes in the vicinity of four warm springs.

The fact that Ireland is not Iceland in terms of geothermal resources is not a valid reason to fail to harness those geothermal resources that we know we do possess and further seeking to locate warm water (35°C to 50°C) at depths of 1 to 2 km. Indeed there are several factors which taken together make a compelling case for this to be done. Such energy is

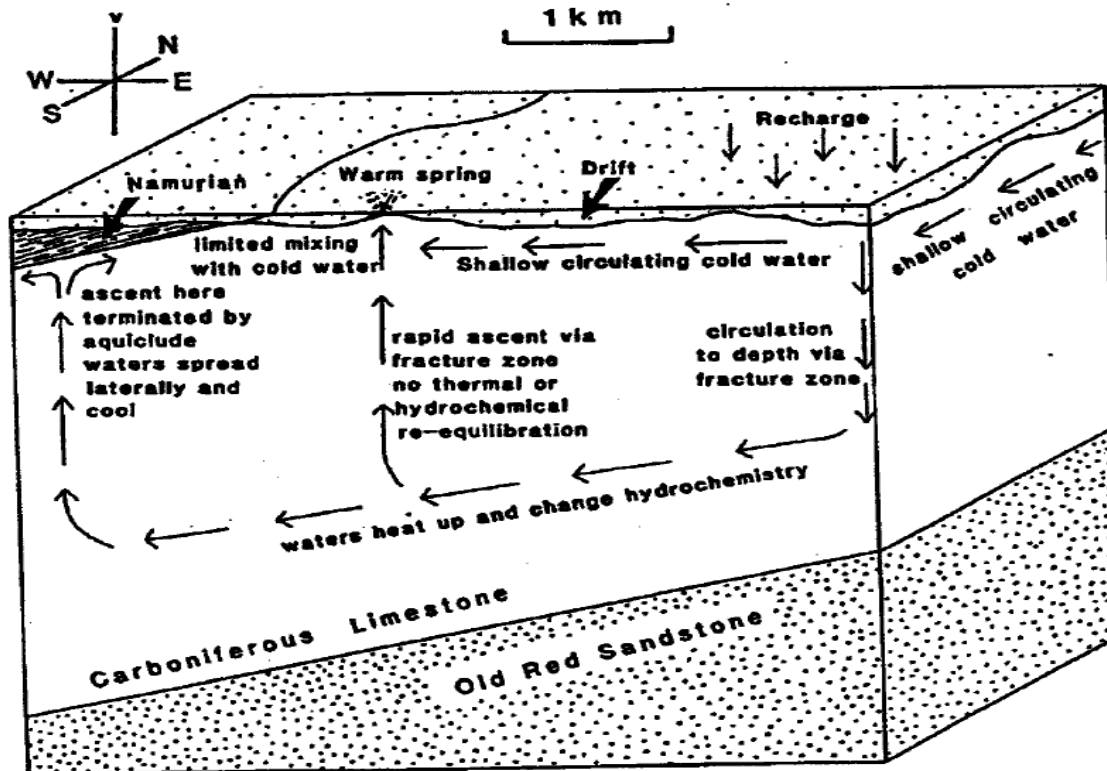
indigenous, widespread, environmentally friendly and almost inflation-proof.

In the last edition of the GAI Newsletter, Cork City Energy Agency described some recent examples from Cork City and County of practical and innovative projects which harness geothermal energy. At a wider level, an Irish led EU supported THERMIE project showed the economic feasibility of harnessing energy from groundwater being pumped from existing high yielding wells in Austria, Ireland and Portugal.

The current energy crisis is a timely reminder that we in Ireland should now go further to harness our geothermal energy. On page 6 of this Newsletter, Brian Connor argues for the exploration and development of deep geothermal waters of Ireland. It is also time to increase the number of demonstration projects using low temperature geothermal energy and groundwater energy in different parts of the country. Such a two pronged approach should be incorporated into Ireland's future energy plans.

**Author: Bob Aldwell**  
**Chairman**

## WARM SPRING MODEL FOR MUNSTER



“A Model for the Munster Warm Springs. The Front Face of the Block is a Fault Zone“.

‘Brücks Model’ seen in the diagram above, illustrates the occurrence of warm springs in Munster. Shallow circulating cold water within the Carboniferous limestone, intersects a high permeability fault zone. This facilitates circulation of groundwater to deeper levels than normal where it is then heated to ambient temperatures.

Warm water rises along the fault zone but is confined by overlying Namurian deposits (younger rock formations which typically lie on top of the limestone). This water is forced to spread laterally along the fault to areas where Limestone is exposed. The water then emerges on the surface as springs. Similarly, warm springs can occur where there is thin or permeable overburden, or where fault zones are exposed by excavation or drilling.

### Your Views

*If you wish to contribute an Article, Feature etc. to this Newsletter we would be delighted to hear from you. We would be happy to include such articles in future Issues. We intend to compile a stock of material for future publications. Subject matter we hope to cover would involve International and National aspects of Geothermal Development as well as creating a Forum for interested parties*

*Please send your views and articles to:*

**.The Secretary, The Geothermal Association of Ireland c/o Spa House, Mallow, Co. Cork.**

**E-mail: mallowre@indigo.ie Tel : 022-43610 Fax : 022 - 43678**