

THE GEOTHERMAL ASSOCIATION OF IRELAND

Newsletter

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Introduction	Geothermal Application: Cork County Council
<p>Dear Members, Welcome to the 6th 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.</p>	<p>Cork County Council are currently in the process of developing plans to build an Environmental Industrial Park in Macroom. The Project named "Macroom E" proposes to develop incubator units for new industries. The units will be constructed to the highest energy efficiency standards set by Building Regulations.</p>
Contents	<p>Heating to the offices will be powered via a 20kw ground source geothermal heat pump capable of projecting 82 kw of low grade heat. This heat will in turn be pumped into an underfloor heating system to heat the first floor offices and ground floor reception area. It has been proven in similar buildings such as the Tralee Motor Taxation offices that two hours of actual heating time between 4 am and 6 am is sufficient to cater for over 80% of the heating load. The remaining 20% is achieved by daytime boosting as the demands dictate.</p> <p>In order to make maximum use of the heat pump it is proposed to harness geothermal energy to provide water at 10°C for summer cooling. The cooling water will be pumped through the ceiling mounted hydrosonic air conditioning units. Should the ground source water at 10°C be insufficient to cater for the building cooling load, the heat pump will be put on the reverse cycle to project 65kw of chilled water at 10°C.</p> <p>Alex Grassick, Cork County Energy Agency.</p>
<ul style="list-style-type: none">◆ Geothermal Application: Cork County Council Pg 1◆ Study tour of G.A.I. Pg 2-3◆ Cases studies from Around Europe Pg 4-5◆ Overview of First Irish Solar Energy Conference and Study Tour Pg 6-7◆ Case Study – Castletownroche Pg 7◆ Interesting Facts Pg 8◆ News Snippets Pg 8	

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), Dr. Alistair Allen (Vice Chairman), Mr Pat Walsh (Secretary), Mr. Seamus Hoyne (Treasurer), Mr Brian P. Connor (European Projects Officer), Prof. Peter Brück (Development Officer).

Study Tour for GAI Members

On July 17th last, the Geothermal Association of Ireland organised a Study Tour, inviting its' members to view a number of applications of geothermal energy in Cork City. Fifteen members attended the Tour and were pleased with the range of sites visited and the topics covered. The following briefly summarises each site.

Kinsale Road Landfill Site

Micheal Lyons, Director Cork City Energy Agency, gave a brief presentation outlining various applications of geothermal heat pumps in the Cork City area. At Kinsale Road Landfill site, heat is generated due to biodegradation of organic material. This heat is harnessed via a horizontal ground source heat pump to provide all the space heating and hot water needed in the administration building. Attendees had the opportunity of viewing the heat pump in this building.

Mr. Liam drummy and Mr. James Goulding briefly summarised the waste situation in Cork City. Currently the Cork region generates almost 450,000 tonnes of waste pa. This far surpasses projected volumes of approx. 270,000 t/a made in 1994. Pending EPA reviews, Kinsale Road Landfill may continue in usage until 2004. An alternative stream for waste must be identified as Cork is undergoing a major waste management crisis. Actions being taken to divert and reduce waste input include: banning commercial glass; City Centre waste paper/cardboard collection scheme; expansion of bring sites network for domestic waste types; recycling facilities for green and timber waste etc.

A copy of presentations made by Cork City Council are available from the Secretariat, GAI.

Swedish Trade Centre

The Swedish Trade Centre in Glanmire represents a number of different Swedish Companies including manufacturers of timber framed houses, ground source and heat recovery pumps, triple glazing, doors etc. The showhouse was erected on site over 4 weeks in April 2000 to Swedish building standards. A team of assemblers/carpenters came from Sweden to erect the house. The walls of this house have 220mm of Rockwool insulation and the windows are triple glazed. Outer doors are solid wood and have 2 layers of steel for re-inforcement, insulation and theft purposes.

The house is heated by a Heat Recovery pump/boiler from the Swedish Company—NIBEAB who are now entering the Irish market. The heat pump, which is located in the utility area, is compact and noiseless. Compared to oil they can save up to 65% and it is a very economical and environmentally friendly way of heating a house.

Knock free Sports Centre

Knockfree Sports Centre is located in the North side of Cork City. Facilities include 6 all-weather pitches and a pavillion. This complex was constructed by Cork City Council and is using Geothermal energy to heat changing rooms. Sarah Danaher (Cork City Energy Agency) and Dr. Paul Sikora (Dunstar Ltd) explained the two different types of heat collectors—the horizontal heat collector and the two vertical heat collectors.

Study Tour for Members (cont'd)

The horizontal heat collector consists of 600m of 1" light gauge LDPE (low density polyethylene) tube buried at a depth of 0.5m over a ground area of 300 m². The vertical heat collectors are two 60m long boreholes (150mm diameter) which have a LDPE loop installed to extract heat.

Input: 4.2kw of electrical energy is required per heat pump.

Output: 17kw of nominal output which is sufficient for most of the year. A back-up gas fired boiler is also used.



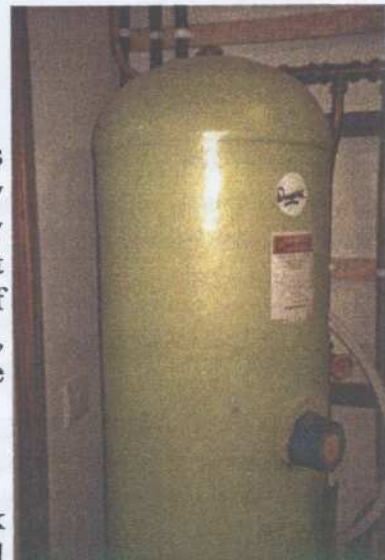
The system is currently being re-assessed to determine how it has performed under Irish operating conditions.

Geothermal Resources – Lee Valley

Dr Alistair Allen talked briefly about geothermal potential in the Lee Valley. Along the Lee Valley, thick sand/gravel deposits have been laid down during the Ice Age. Water in these sands/gravels tend to be at a slightly higher temperature than normal groundwater. City activities generate heat which is stored in the concrete, tarmac and transferred to groundwater. To investigate this potential resource, a desk top study was carried out to identify potential sites for exploitation. Three sites were identified and boreholes drilled at City Hall, County Hall and the Lee Maltings (UCC). Boreholes (10-14m deep) were pump tested and yield, temperature and water levels were monitored. One well yielding 40m³/hr at a temp of 13°C! Two wells abstracting 100m³/hr could provide 100kw of geothermal energy.

Share Centre, Shear Street

We visited the new Share Centre in Shear Street, which is under construction. The complex will be heated by geothermal energy derived due to the processes described by Alistair Allen. A borehole was drilled and a vertical heat collector was installed by Dunstar Ltd. Mr. Paul Sikora of Dunstar Ltd. explained the mechanism of the heating pump, allowing us to see first hand what is involved in the installation of this type of pump.



The Geothermal Association of Ireland wishes to thank Cork City Council, for allowing us to visit Kinsale Road Landfill and Knockfree Sports Centre as well as presenting talks at both locations. Special thanks also goes to Dr. Paul Sikora and John Roche of Dunstar Ltd, for arranging the Shear Street visits and presenting talks at both Knockfree and the Share Centre. Finally thanks to the Swedish Trade Centre for their excellent presentation and very welcome refreshments.

Geothermal Case Studies from Around Europe

There is enough heat stored in the earth's interior to cover the total energy demand of mankind for the rest of the lifetime of the biosphere and even beyond.

There are many places in Central Europe which are using geothermal energy as its main source of energy. Here are some examples of the application of geothermal energy in Europe.

Erding (Germany)

This village is situated northeast of Munich, the capital of the Free State of Bavaria. In the 1980s hot water was discovered by oil drillers who were searching for oil and gas. Following this discovery the association "Erding Geothermal Heat" was created, with the target of using this hot water for better purposes, i.e. thermal baths.

The 2.350 m deep well yields around 55 L. of thermal water per second at a temperature of 65°C. The well was given the name of "Ardeo Spring" and in principle would be drinkable but it is too hot and for bathing the temperature is also too high.



The "Ardeo Spring" supplies up to 24 litres of thermal water per second to the Geothermal Heating Plant. Following heat exchange, the temperature of the thermal water drops to 40-45°C. The thermal energy obtained in this way is transformed within the machine causing the temperature to rise to 85°C, this is used in the heating network. It is an absorption-type heat pump with a capacity of 6,800 kW. It works on an environmentally friendly mixture of water and lithium bromide and is driven by hot water at temperature of 175°C which is heated by gas burners.

Part of the water cooled in the system is supplied to the Erding Water Fun Park; another part is treated, used as drinking water and is supplied to Erding households.

About 2000 flats in the new residential area of Altenerding-South, Seidl Park have been connected step by step to the district-heating network. This network has a total length of 13

Km and extends to the centre of the city. Upon completion, 5.000 inhabitants of Erding will be supplied with local geothermal energy.

Altheim (Austria)

Altheim is a market town located in the federal land of Upper Austria. District heat supply is becoming more and more popular as it requires little space in the home and above all it is unconnected with rising oil gas prices

The supply has to deliver more and more hot water, which is pumped upwards to the surface.



Case Studies from Around Europe (cont'd)

The heat is extracted, the water is fed back again into the underground and is reheated. The heat exchangers consist of numerous metallic plates with the hot thermal water flowing. The thermal water is permanently re-heating the district heat supply system thus being cooled itself. The plates of the heat exchanger prevent the thermal water and the water of the district supply system from coming into direct contact with each other.

The system consists of two boreholes, one producing the hot water bringing heat up from the deep underground and the second sending back down the cooled water. The technical term for such a system is "geothermal doublet". At the surface, the distance between the two boreholes is about 50 m, and 1,700 m in the depth. Thus, the deviated borehole was given a total length of approx. 3,100 m.

Although the thermal water of Althea is boiling hot, its temperature of 106°C is still not sufficient to turn a turbine to generate electric power. That is why a special type of turbine was developed for Althea, in Italy, which can work at lower temperatures: a so-called OR turbine.

The process is based on a working substance which flashes into steam already at the relatively low temperature of 106°C of the Althea thermal water. This steam drives the turbine. In this way, approx. 1.000 kW can be produced from about 100 litres of thermal water per second.

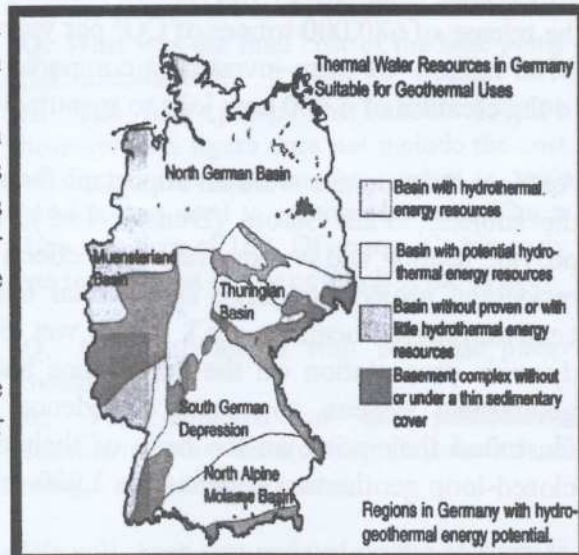
Once the water has passed the turbine house, it has a temperature of about 60°C and is reinjected into the deep underground through the second borehole. When percolating through the hot deep rock, it will be re-heated in the course of time.

Mecklenburg-Pomerania (Germany)

Mecklenburg-Pomerania is situated in Northeast Germany. It is a small town with about 7,500 inhabitants

In the deep underground, the North German Lowland Plain is stratified by porous sandstone layers in which water was accumulated millions of years ago. This water is highly mineralised, and its temperature increases with depth.

The sandstone is covered by layers which are impermeable to water. Accordingly, no water is added to the existing one.



Eduardo Plaza; Cork County Energy Office.

REIO's First Irish Solar Energy Conference and Study Tour "See the Light – No Bills from the Sun"

On June 20th and 21st, the Renewable Energy Information Office held its first annual conference on solar energy at the Brandon Hotel in Tralee. The conference, organised with the support of the Royal Institute of the Architects of Ireland, was a very successful event in terms of the quality of the speakers and the level of attendance. Seventeen speakers from Ireland and Europe, each of them highly acclaimed experts and practitioners, covered technical, environmental and socio-economic issues related to the application of passive solar design, ambient heat pumps and active solar thermal energy. Over 150 delegates from all over the country and various backgrounds (architects, engineers and installers, planners, academics etc.) attended the solar conference.

One of the objectives of the conference was to demonstrate that solar energy technologies offer a realistic and practical solution to our looming energy crisis. According to Paul Kellett (Technical Manager at REIO), "Ireland is facing important challenges related to its energy use and supply. Predictions on the impacts that climate change will have globally and locally are alarming. Our economy is also dependent on the import of 86% of our total primary energy requirement, exposing us to volatile oil markets and fossil fuel resources with a life-span no greater to 50 years." Today solar energy technologies can help us to meet those challenges and provide us with a more sustainable energy economy. Solar energy is free, clean and endless.

According to Xavier Dubuisson (Energy Manager at REIO), solar energy systems are still very much a niche market in Ireland, but that is changing rapidly. The number of companies involved in the sector has doubled in less than two years and sales of solar equipment have been growing by 200 to 300% every year for the last three years. According to REIO's projections, solar energy will replace annually 2.63 TWh of primary energy by 2010, avoiding the release of 680,000 tonnes of CO₂ per year. By then the solar energy market will be worth €700 million of extra-investment compared to conventional technologies. This would lead to the creation of 4,400 new jobs to manufacture, install, operate and maintain the equipment.

Ambient heat pumps were an important focus of the conference with four speakers covering the subject. Paul Sikora (Dunstar Ltd.), demonstrated that ambient heat pumps could provide heating and cooling very cost-effectively in a wide range of applications, from small residential projects to large commercial buildings, including challenging situations (urban centres, remote locations etc.). Guus van Gelder and Peter Heaton (Groenholland), gave a dynamic presentation on the importance and the benefits of careful testing and design of geothermal systems to create confidence, enhance quality and reduce liability. They illustrated their point on the basis of their experience with the design and application of a closed-loop geothermal system for a 3,000 m² office building in Croydon in England.

The conference delegates had the opportunity to visit the Motor Tax Office in Tralee during a study tour hosted by Millie Moynihan, Energy Manager at Kerry County council.

Solar Energy Conference (cont'd)

The building is a very good example of sustainable energy in action, including high level of insulation, natural ventilation and daylighting, solar water heating and a ground source heat pump system for space heating and cooling. As a result, the whole building achieves an Energy Cost Performance ratio of 7.80/m²/year (50% less than typical buildings of this type).

Hansueli Bruder, director of the Swiss heat pump manufacture Satag Thermotechnics, outlined the key ingredients to the Swiss success story: an effective marketing strategy, strategic alliances with utilities, policy makers and installers, as well as a stringent quality assurance scheme and applied R&D. Brigitte Bach, from Arsenal Research in Austria, presented the D-A-CH quality label for the testing and certification of heat pumps developed in common by the Austrian, Swiss and German heat pump associations. This quality label played a very important role in raising the quality of the heat pump equipment and services available in these three markets, resulting in higher consumers confidence and a more competitive heat pump industry.

The solar conference provided delegates with an in-depth understanding of solar energy and a certain conviction of how much could be achieved here in Ireland by applying the right technologies, skills and policies: Irish houses without heating systems, solar or geothermal central heating etc. Solar energy in Ireland is still in its early stage here but with enthusiasm and inspiration we can move forward quickly. It is our responsibility as professionals in the energy sector to show vision and leadership on this.

Xavier Dubuisson, REIO, Bandon.

Heat Pump Case Study Castletownroche

In the last edition of the GAI Newsletter, we featured a newly installed Geothermal Heat Pump at Ballygriggan House, Castletownroche. The house underwent major refurbishment and a heat pump was installed along with underfloor heating. As a follow on to that article we recently contacted the owner – Mary Rose Cooney to find out how they are getting on with their new heating system.

Q. Has the Heat Pump given you any problems since it was installed last summer (2001)?

A. No problems have been encountered, the system is operating smoothly.

Q. Have comfort levels improved in the house?

A. The comfort levels have much improved although, of course, the real test is the winter time and because last winter was so mild, it is difficult to say yet how the heat pump will react in a very cold period. The underfloor heating was set at 20°C during the Winter and in Summer is set at between 14 and 16°C .

Q. Are you still using the oil fired range to heat the older part of the house?

A. No the range is now turned off all the time.

Q. What was the final cost of the heat pump (inc. installation)?

A. The heat pump cost about €10,000 however, this figure does not include the cost of digging the hole in the garden (a rock breaker was used to excavate an area 32m x 10m to a dept of 1m). Of course it's too early yet to comment on the payback of the system.

Q. Are you pleased with the heat pump overall?

A. Yes delighted so far, particularly considering the environmental benefits of using a renewable resource.

We will keep you updated on the economics of Cooney's heat pump and how they fare the Winter in the next edition of the Newsletter.

Eduardo Plaza, Cork County Energy Office.

Interesting Facts about Heat Pumps

- ◆ Heatpump ground loops are laid at a minimum of 600 mm depth to get below frost level. These pipes, if installed properly, can last up to 60 years. They are low density polyethylene pipes, general purpose black plastic water pipes. These are resistant to acids and alkalis and do not rust. Ground loops have no adverse effects on trees, grass or shrubs.
- ◆ A good rule of thumb, is that the area of ground require is approx. equivalent to the floor space of your house.
- ◆ The estimated payback period for a geothermal heat pump is 10 years.
- ◆ For every one unit of electricity used to drive the heat pump, four units of heat are obtained.
- ◆ Heat pumps work best with underfloor heating. This is because the heat pump gives out 52°C maximum, which is not hot enough for radiators. With underfloor heating, you need water at 45°C only, which is ideal for a heat pump. Underfloor heating pipes can also be laid upstairs between the joists. The mass necessary to store the heat is provided by pouring concrete around the pipes between the joists using rigid insulation as a permanent shuttering.
- ◆ In older houses, where you may not want to rip up floor boards and install underfloor heating, solo-units can be fitted. These are smaller than radiators and have a fan which circulates air around the house. These also operate at a lower temperature than radiators which makes them ideal for use with heat pump technology.

News Snippets

Establishment of ISEA

Some of you may be aware that the Irish Solar Energy Association (ISEA) was established in late July 2002. It is likely that the objectives of this new Association will overlap to some degree with the objectives of the Geothermal Association of Ireland particularly concerning the promotion of ground source heat pumps.

The Officers, on behalf of GAI, presented a portfolio of information about our Association to Mr. Andy Tucker who organised the establishment meeting in Thurles on 26th July. The cover letter proposed that a close liaison be established between the two Associations through meetings, collaboration of activities etc. We will keep all members posted of the outcome of our presentation and of further developments with ISEA.

Best Regards

Recent changes within Cork County Energy Agency has resulted in the departure of two prominent members of the GAI.

Firstly Mr. Pat Walsh, who was instrumental in the setting up of the GAI, has moved on as Director of Cork County Energy Agency to a more prominent position within Cork County Council. Secondly Ms. Colette Cronin, who took an active role in the administration and organising of the associations activities during the year, has moved to Teagasc in Dublin.

On behalf of all in the GAI we wish them our best regards for the future.

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:

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