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# EUROPEAN HEAT PUMP

issued by the European Heat Pump Association

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Issue 4/1 January-Juni 2003

## EHPA NEWS

### 4th annual meeting, Vienna

The 4th annual meeting of the EHPA was held on 4 April 2003 in Vienna, hosted by Arsenal Research. The following Chair's annual report describes some aspects of the last year's activities.

### Chair's report for 2002

The Gulf War reminds us yet again of the growing realisation that countries are more interdependent than ever and that we must use whatever resources are available as efficiently as possible. Using less resources and less energy will result in a lower environmental burden and impact and will lead to a more sustainable society.

Heat pumps can contribute to this technology shift because of their high efficiency in concentrating low-grade renewable heat to provide heating or rejecting high-grade heating to provide cooling. It is therefore a core technology, which can be used to provide space heating or cooling, water heating and to recover waste heat from industrial processes.

***The role of the EHPA is therefore to ensure that this technology will make a significant contribution to a more energy sustainable Europe***

The EHPA's activities can be grouped around various themes -

*Education and training* - Brigitte Bach chairs this new Committee, which is holding its workshop the day before our AGM. It aims to develop and transfer knowledge and best practice of sizing, installing and maintaining heat pump installations

*Labelling* - as the European's Commission aim is to label other forms of heating and cooling first, work on an EU energy label will not start for at least another 5 years; the alternatives are to expand the DACH label or identify countries willing to promote the EU eco-label.

*Information* - Axel Lehmann continues to manage our website whilst Gerdi Breembroeck has edited our newsletter over the past 3 years. The impact of this information is not known but at very least our website provides a gateway to persons searching for specific information about heat pumps.

*Strategic advice* - The EHPA provides relevant advice to various parts of the Commission particularly those involved in demand management, renewable energy sources, environment and eco design of products. At national level this is undertaken by individual members or national heat pump associations.

*Product improvement* - Whilst this is the responsibility of individual manufacturers or component suppliers, the EHPA's role is to ensure that

such energy efficient devices will be able to fulfil a continuing need.

*Working with other organisations* - An important part of our work is establishing links with other like-minded organisations. The CEA in Grenoble has invited us to share the coordination of a new proposed Framework 6 project to help SME's with developing and installing advanced heat pump technology. AREA is a European organisation representing installers of various types of climate control equipment including heat pumps with whom we should work closely. Organisations from Estonia, Bulgaria and Ireland have joined in the past year to expand our geographical coverage of Europe.

*Focus* - The world is closer to its physical limit of oil supply than at any time in the past 100 years. There is therefore a need to move away from a hydrocarbon society to which we have become so addicted. One way of reducing oil dependence is to replace the oil heating systems in the 30 million dwellings with some other preferable renewable heating source. This is a big challenge, which the EHPA can only tackle by working closely with other stakeholders and national and local authorities.

*Some final thoughts* - In many discussions about renewable energy sources, heat pumps are hardly ever mentioned. This either means that they are accepted or more likely no one knows of their potential. The EHPA therefore provides a forum to share ideas about how best to promote our technology

Our success ultimately depends upon each member's willingness to promote the advantages of the technology. A further opportunity will arise when the new Intelligent Program starts next year on Public awareness initiatives for an energy sustainable Europe, which will help individual citizens to understand how they can save energy and the environment. The EHPA must ensure that it takes a proactive part in this initiative.

Rayner M. Mayer  
Chairman, EHPA

### Webmaster's Report

*The EHPA operates a website which is maintained by FIZ, Karlsruhe. There has been a further increase in access to our site.*

#### 1. EHPN/EHPA Website Statistics

The following analysis is based on:

- Most visited sites and PDF Downloads in IV/2002
- Total number of page requests in 2002

The ranking of **most visited sites** in IV/2002 (Table) shows no substantial changes versus III/2002. The EHPA homepage is now on the top, followed by international news, EHPA newsletter, heat pump basics and the English version of the heat pump brochure. New in this list is the item „Ehpa related projects“, indicating an increased interest in our European project activities. Again the country information from Austria, Germany, Netherlands, Spain, Switzerland and UK gained the most interest.

As before the EHPA heat pump brochure and selected newsletter issues have been the most **downloaded files**. Newly in the list appearing are a heat pump market overview (EDF), the EHPA strategy report as well as the Expression of Interest „Heat Pump NoE“.

**EHPN / EHPA Web Site Statistics - most visited sites 4th quarter 2002**

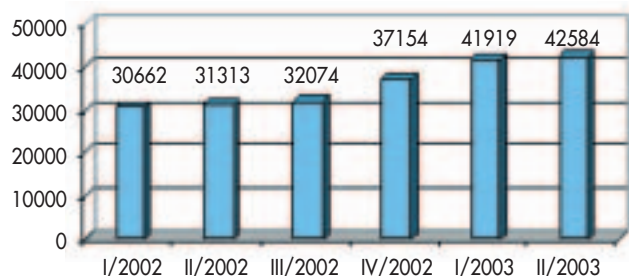
No.	Site	Requests
1	EHPA home page	4.693
2	News international (DE: 375; NL: 250; CH: 232)	3.520
3	EHPA Newsletter (Issues 1999-2002)	3.342
4	Heat pump basics	1.478
5	EHPA heat pump brochure (English)	1.402
6	About EHPN	1.044
7	Regulations, Standards: Germany	753
8	Market international (AT: 215; DE: 209; CH: 197)	719
9	EHPA related projects	676
10	EHPA publications	541
11	Publications international (ES: 225; DE: 162; UK: 128)	515
12	Links international (DE: 207; AT: 115; UK: 110)	484

**2. EHPA Website enters Google „Top Ten“**

When starting a search for „heat pump“ using the popular Internet search engine „Google“, you will find the EHPA Website on the first page of your search results. End of March 2003 the Website ranked place 9 of around 1.2 million heat pump related links and is within the Top Ten of other search engines like Yahoo, Fireball and Altavista too. This „pool position“ provides a good opportunity to spread interesting information on this efficient and environmentally benign technology for heating and/or cooling worldwide.

In 2002, over 130 000 page requests have been registered and the tendency is continuously increasing in 2003 (see Diagram). However, to stabilize this trend in the future a clearly stronger contribution from

**EHPN / EHPA Web Site Statistics (2002/2003)**



nearly all EHPA members is required. Furthermore the members are invited to take the opportunity to advertise their products and services on this Website.

**3. Update**

To make the search for specific country information easier, only the buttons for those countries really providing information on the respective pages are still available.

A comprehensive information update was carried out for nearly all items of the EHPN/EHPA Websites, with emphasis on News, Market, Publications, Best Practice as well as EU Projects and EHPA related projects.

**4. Inquiries**

Around 40 inquiries obviously coming from Website users had been answered in the year 2002.

*Axel Lehmann  
FIZ, Karlsruhe*



*Home page, EHPN web site located at www.ehpa.org*

**NEWS**

**New Treasurer of EHPA**

At the AGM, Michaela Vezmar was elected as Treasurer to replace Simon Armstrong who served for the year 2002/2003. Michaela is located at Arsenal Research in Wien and is also the secretary of the DACH organisation.

## European Accreditation of Installers

It was agreed that the EHPA should develop a European accreditation scheme for installers. The criteria would be based on the experience of those countries operating national schemes and would comprise three levels; European, national and product specific. The first action would be to accredit those national schemes, which met EHPA's criteria. For further information contact Brigitte Bach, Arsenal Research, Email [bach.b@arsenal.ac.at](mailto:bach.b@arsenal.ac.at)

## New members (2002/2003)

The following members have been elected

- ESPEL, Estonian Heat Pump Association (June 2002 newsletter)
- Geosolar V-63, Bulgaria
- AFPAC, Association Française pour les Pompes à Chaleur (December 2002 newsletter)
- AREA, European Association of Installers of Heating Equipment
- Copeland, a manufacturer of compressors, which form one of principal components of heat pumps.
- Sustainable Energy Ireland, an agency funded by the Irish Government to develop & exploit sustainable energy sources in Ireland.

## LABELLING

### DACH quality label

The DACH executive decided at its recent meeting that this label would be available for manufacturers and importers to use in countries other than the three foundation countries namely Germany, Austria & Switzerland.

This extension will assist countries that make subsidies or grants available for installing renewable energy sources like heat pumps.

For further information on the DACH labelling scheme, please contact

Michaela Vezmar, Secretariat, c/o Arsenal Research, Vienna,  
Email [michaela.vezmar@arsenal.ac.at](mailto:michaela.vezmar@arsenal.ac.at)

### Ecolabel

Recently agreement has been reached at European level to energy label, room air conditioners which may also include a heating function. The EHPA decided at its June executive meeting to explore the possibility of applying for eco-labelling of heat pumps. The European eco-label, as its name applies, concerns the environmental impact of products rather than only its energy consumption and performance. Representations will now be made to the European Eco-labelling board.

### SHERHPA

This is the acronym of a joint proposal submitted by GRETH and the EHPA for funding to the Directorate for Research within the horizontal activity to help small manufacturing enterprises. The outcome of the submission will be known later this year. SHERHPA stands for the Sustainable Heat and Energy Research for Heat Pump Applications. A brief description follows -

Sustainable energy systems, such as heat pumping technologies, provide an efficient use of renewable energy from the ambient and of waste heat sources. Typical applications are space heating, domestic hot water and processes with combined heating and cooling. Doubling the number of heat pumps in Europe by 2010 would increase the annual energy and CO<sub>2</sub> emission savings to 100 TWh and 40 million tons respectively. To achieve such an ambitious target on European level and to support the creation of a strong market impact, in addition to the European Heat Pump Association, EHPA (policy, strategy and marketing) and the European Heat Pump Network, EHPN (dissemination of information, Website) a dedicated project towards SMEs is jointly proposed by GRETH (Heat Equipment Association) and EHPA

This project will consider the development of heat pumps that are cost-energy efficient and in compliance with the future environmental regulations. The new environmental regulations, concerning greenhouse gases and the protection of the ozone layer, will lead to the phase out of conventional refrigerants. For example, in the EC the 'Freon' R22 phase out is scheduled in 2010. Therefore 'natural fluids' have to be adopted (hydrocarbons, carbon dioxide or ammonia), but this implies a change in the components technology and control system. Heat pumps are components that allow energy savings for heating and cooling buildings and for many industrial applications, and concern a very large spectrum of applications much wider than the existing heat pump market.

During the first half of the project, components and subsystems (heat exchangers, controllers, ground coupling system, heat recovery...) will be developed, tested and optimised. Afterward, during the second half of the project, prototypes will be developed and tested in laboratories prior to field tests. In parallel with these research activities, a training programme will be set-up. This programme will include technical training and e-learning for engineers.

This project will be coordinated by two independent associations (Greth and EHPA), that have complementary activities; the core group is composed of 20 SMEs from 12 countries, including participants from the newly associated states; and the RTD work will be performed by 10 centre of excellence, from 9 EC and associated countries, in the area of heat pumps, energy and control.

*Bernard Thonon*

*Greth*

## TECHNOLOGY

### Design of vertical borehole heat exchangers Validation of the EWS program and optimisation of the borehole heat exchanger depth

*Dr. Martin Zogg, Switzerland*

The EWS program module for PCs developed under contract to the SFOE is characterised by very short calculation times. This is achieved by an intelligent combination of analytical calculation in the area remote from, and numerical calculation in the vicinity of the borehole heat exchanger. The EWS module treats the two-dimensional heat flow around the borehole heat exchanger and is suitable for integration into simulation programs such as WPCalc. The program was validated for the specific

case of a 265 m deep double-U borehole heat exchanger by comparing the results with those obtained from the comprehensive three-dimensional numerical simulation programme, FRACTure. In designing heat pump installations the long-period results are of particular relevance. For this range, the temperatures of the heat medium at outlet from the borehole heat exchanger given by the two programs are in very good agreement. Additional validation will be provided by a further PSEL<sup>1</sup> project now underway to obtain measured data for a borehole heat exchanger of the same depth installed in a private dwelling.

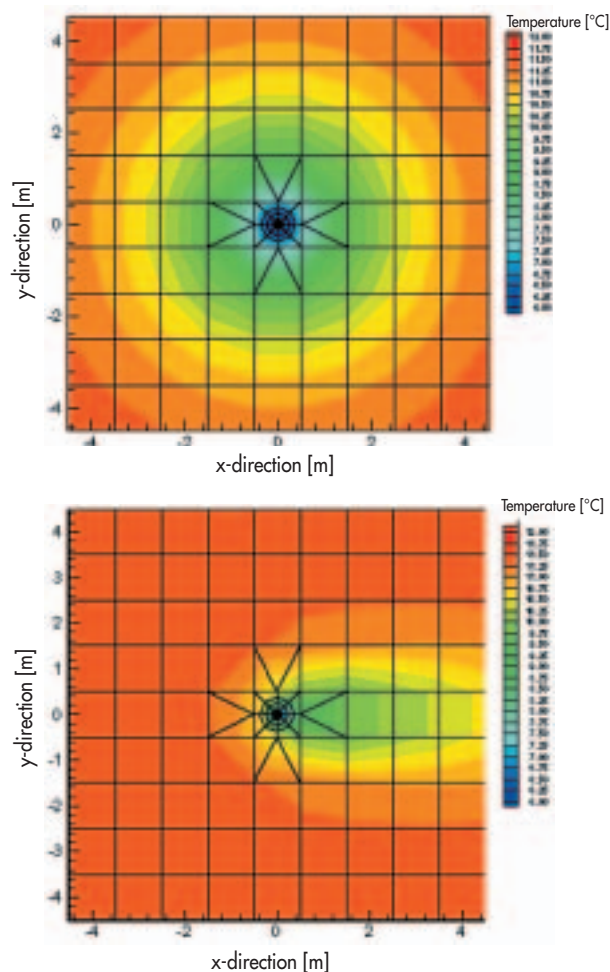
To obtain the optimum depth of the borehole heat exchanger, several variants of the above heating system (Tab. 1) were calculated for a given heat consumption (at 0°C: 19 kW at a flow temperature of 35°C). In addition to the heat balance, the pressure losses in the borehole heat exchanger were calculated and the costs estimated. Provided the flow rate in the borehole heat exchanger was chosen to minimise pressure loss, installations with a single deep borehole heat exchanger (Variant 1) proved energetically more efficient and less expensive than those with several shorter borehole heat exchanger s (Variants 2 to 4). In comparison to the case of several shorter borehole heat exchanger s spaced at 5 m distance, the deep borehole heat exchanger gives a seasonal performance factor that is 3.3% higher than for Variant 2 and 7.4% higher than for Variant 4. For 7.5 m spacing, the seasonal performance factor is still improved by 2.4% and 5.1% respectively.

**Tab. 1:** Investigated heating systems for a private dwelling

Variant	Number of borehole heat exchanger	Length of borehole heat exchanger [m]	External diameter of borehole heat exchanger [mm]
1	1	300	40
2	2	150	32
3	3	100	32
4	6	50	32

In the present study, the influence of ground temperature at the surface, ground conductivity and groundwater flow on the heat yield of the borehole heat exchanger was investigated. The influence of the ground surface temperature proved to be considerable, so that it is important to determine this carefully in designing borehole heat exchanger installations. At higher altitudes, deeper borehole heat exchangers are required. The heat yield was found to increase at higher ground conductivity, the increase amounting to approx. 15% per W/mK in the case under study. Also, the temperature field surrounding the borehole heat exchanger is significantly affected by the presence of groundwater flow.

The relationship between heat yield and groundwater flow depends not solely on the groundwater flow rate, but also on the ratio of the magnitude (thickness) of the groundwater substrate (aquifer) to the depth of the borehole heat exchanger. However, the depth of the aquifer below the surface plays a subordinate role. As the heat well designer does not usually have detailed information on these parameters, the higher system efficiency obtainable in the presence of groundwater flow must continue to be regarded simply as an additional bonus.



*Fig. 1: Influence of groundwater flow on temperature distribution in vicinity of borehole heat exchanger. At left: without groundwater flow; at right: with groundwater flow [excerpt from final report].*

*Further information:*

*Prof. Dr. Thomas Kopp*

*Head of the Swiss Federal Office of Energy's Research Program on Ambient Heat, Waste Heat and Cogeneration (UAW) [www.waermepumpe.ch/fe](http://www.waermepumpe.ch/fe) [tkopp@hsr.ch](mailto:tkopp@hsr.ch)*

Detailed final report on the SFOE research project (in German): S. Signorelli, Th.Kohl, Validieren des Programms EWS und Optimieren der Erdwärmesondenlänge, Final Report, Swiss Federal Office of Energy, 2002.

Download from [www.waermepumpe.ch/fe](http://www.waermepumpe.ch/fe) (see section 'Berichte / Wärmequellen')

Text obtainable quoting ENET number 220186 from ENET, Egnacherstrasse 69, CH-9320 Arbon, Switzerland, Tel. + +41 (0)71 440 02 55, [enet@temas.ch](mailto:enet@temas.ch)

*EHPA secretariat*

*Robert Garwood, Building Research Establishment, Garston, Watford, WD25 9XX, United Kingdom Tel + 44 1923 664 621 email [garwoodr@bre.co.uk](mailto:garwoodr@bre.co.uk) Internet [www.ehpa.org](http://www.ehpa.org) Editor Rayner Mayer, Sciotech Projects*

<sup>1</sup>PSEL = Project and Study Fund of the Swiss Electric Utilities

Deadline next issue: **2003**

Secretariat: Mr Robert Garwood  
Building Research Establishment  
Garston, Watford WD25 9XX  
United Kingdom  
Tel.: + 44 1923 664 641  
Fax: + 44 1923 664 692  
E-mail: [garwoodr@bre.co.uk](mailto:garwoodr@bre.co.uk)  
Internet: [www.ehpa.org](http://www.ehpa.org)

Editor in chief: Mr Jos Bouma, Novem  
Technical editing: Ms Gerdi Breembroek, Novem  
Production: de Vormgeverij

Frequency: quarterly