

EUROPEAN HEAT PUMP NEWS

issued by the European Heat Pump Association EHPA



Issue 2/3, September 2001

EHPA NEWS

EHPA activities

Rayner Mayer, Chair, reports

At the executive meeting in June a tribute was paid to Dieter Witwer of the Swiss Heat Pump association, who died tragically in a glider accident earlier in the month.

Robert Garwood of the Building Research Establishment was elected treasurer to replace Jean Yves Cherruault, Sciotech Projects, who had undertaken this work on a temporary basis since the association was founded. The membership application of "l'Association Confort Econature", formed to promote the use of heat pumps in the French domestic housing market, was approved.

The final draft of the EHPA's strategy policy was approved and a third technical sub-committee was formed to consider all aspects of information, education and training. Its initial task will be to consider suitable criteria for the approval of training and educational courses. The University of Harnosand in Sweden requested approval for a new course it is developing to accredit Swedish installers.

The Swiss HPA is developing a course for approving drilling contractors, which could form the basis for a European course.

The EU Climate Change Programme was reviewed and the programme was formally launched at a stakeholders meeting on 2-3 July 2001 in Brussels. This will now form the basis of the EU's ratification of the Kyoto treaty following agreement between the parties in Bonn in July. Heat pumps are cited as a core technology to replace direct electric heating.

Rayner Mayer

E-mail:

rayner@sciotech.demon.co.uk

EHPA at SolarEnergy

Germany - The SolarEnergy trade fair was held in Berlin from 8-10 June 2001, with Heat Pump EXPO participating for the first time. About 25,000 people visited 300 exhibition stands to gather information about renewable energy.

The European Heat Pump Association (EHPA) was represented on the German Heat Pump Association (IWP) stand and publicised European activities and the significance of joint action in the promotion of heat pumps, see Figure 1. The stand acted as a meeting point for politicians, manufacturers and visitors. Various topics relating to heat pumps were discussed, and questions raised during a series of lectures were answered.

As the Heat Pump EXPO has received positive feedback from exhibitors and visitors it will be present at SolarEnergy again next year.

Joachim Ogorek, Germany

E-mail: joachim.ogorek@fp-werbung.com



EHPA represented at the SolarEnergy trade fair.

Advertising on the EHPN/EHPA Web site

The target group

The EHPN/EHPA web site is designed primarily for a clearly defined target group of international heat pump professionals active in the fields of research & development, production, marketing, planning, installation, as well as associated stakeholders, and for decision makers, politicians, organisations and lobby groups.

The statistics

The statistical data on the web site emphasizes the increasing interest in this source of information. During the period from early 1999 to mid-2001 over 231,500 hits on individual pages of the site were registered. The number of quarterly requests increased from around 21,300 in the first quarter of 2000 to 38,520 in the second quarter of 2001, representing an increase of more than 80%.

The direct response

Every time the audience you have targeted with your promotion visits the EHPN/EHPA web site, your company and product benefit from brand recognition. Visitors are able to click onto your web site via the linked advert.

Advertising options and price

You can place a fixed or animated interactive banner on the EHPA site. The banner size is about 284 x 46 pixels (rectangular). It should be submitted as a "gif" or "jpeg" file, or in any other format that can be constructed using HTML statements.

The price for one banner is EURO 500 per year.

Service contact

To discuss an advertising solution that is tailor-made for your company, please contact:
Dr.-Ing. Axel Lehmann
EHPA Secretariat
Address on back cover.

The bedrock – an important heat source (2)

This is the second part of a two-part series. The first part, published in June, discussed the technical issues relating to the installation of borehole heat exchangers. This part discusses economic and future perspectives.

Well and heat pump costs

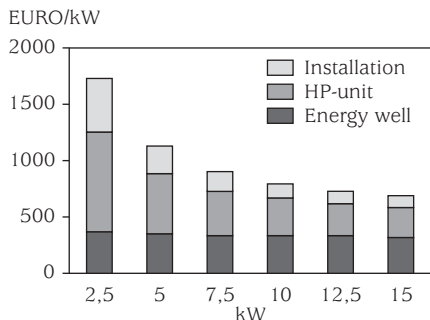


Figure 1: Heat pump installation cost per kW installed heating output in Sweden.

Figure 1 shows the total cost per kW (exclusive of VAT) for bedrock-coupled heat pumps providing 2.5-15 kW of heat output in Sweden. The data is based on a limited market survey carried out in early 2001. The total cost per kW of the heat pump installation is divided into the energy well, the heat pump unit and installation. The cost is valid for a single-family house in the south of Sweden with an existing hydraulic heating system. The heat pump delivers space heating but not domestic hot water, with the boiler providing auxiliary heat. The COP for one year is 3 and the cooling power in the well is 45 W/m. The overburden layer (rock covering) is two metres thick.

Figure 1 shows that the cost of the energy well is significant, being between 25-45% of the total installation cost. Also, a bigger heat pump is more profitable than a small one. For example, a 10 kW heat pump is about 30% cheaper per kW than a 5 kW heat pump.

The cost of the energy well includes drilling, installing a plastic collector filled with anti-freeze solution, piping into the house, and hydrostatic testing of the well. The drilling company normally delivers the complete energy well as a unit.

Expanding market for heat pumps

Both the majority of the existing housing stock and new single family houses are small and have a low heat demand. A heat pump

capacity of between 2-5 kW will therefore be sufficient in most cases. To reach a larger market with this technique it is vital that the total installation cost is lowered, especially for small installations. This can be done by improving heat pumps, using better and more rational methods to install them, and reducing the cost of the energy well.

The current techniques and equipment for drilling in Sweden are for holes as deep as 180 m. For shallower boreholes the cost can be lowered by:

- adjusting the capacity of the drilling equipment for shallower holes. A lighter drilling rig and smaller compressor give a substantially lower investment cost, lower running costs and easier transportation.
- using more cost-effective techniques when drilling shallow holes, (< 60 metres) by using top hammer drilling rigs, for example.
- better logistics, shorter and more efficient transport of personnel and equipment.

Improved drilling equipment and the use of more appropriate techniques could lower the cost of energy by approximately 10-20% and this would also allow owners of smaller and/or newer houses to buy economically profitable heat pumps. Increased volumes and more competition will also play a part.

It is important to note that energy wells have become an important and increasingly profitable part of the drilling company business today. No demands are made on water volume or quality and in most cases the drilling company does not even provide the hole itself. The price of boreholes for energy could therefore be lower than traditional water wells.

Heating and cooling – a profitable combination

Installations for both heating and cooling are on the increase and the energy well combines these two functions admirably. During the winter the well is used as a heat source and during summer for heat-absorption, with the heat being transferred to the bedrock via an additional heat exchanger in the brine circuit. This is achieved by circulating the brine solution without running the heat pump. When cooling, the borehole is recharged which means that the average temperature of the brine fluid is higher over the year, thus improving the COP of the heat pump. Alternatively the depth of the borehole can be reduced when cooling is used. The additional investment cost for free cool-

ing is low, which makes the total installation even more profitable if cooling is also desired.

The number of bedrock heat pump installations is increasing rapidly in Sweden. There are about 150,000 units today producing more than 4 TWh of renewable energy per year, which is equivalent to a year's production from a medium-sized nuclear power station. With the present rate of increase this number will probably double within 5-7 years.

Bengt Sandström

E-mail:

Bengt.sandstrom@stockholm.mail.telia.com

MARKET NEWS

Norway: market growth of nearly 30%

Norway – The 3,395 heat pumps sold in Norway in the year 2000 represented an increase of nearly 30% on sales in 1999. In recent years the Norwegian heat pump market has grown favourably, see Figure 2. In 2000 there was a 12% increase in Norway's total heat pump stock, which stood at 30,600 installations by the end of the year.

Most installations were installed in residential property; 86% of the heat pumps sold in 2000 were in the capacity range 0-10 kW and 93% in the range 0-25 kW. Three installations of more than 1000 kW were added in 2000.

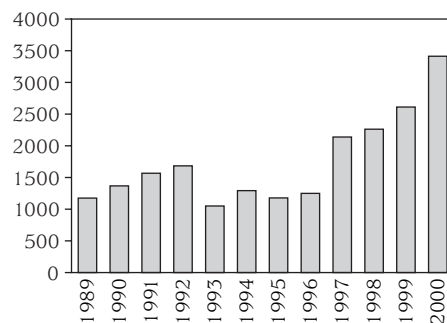


Figure 2: Number of heat pumps installed annually in Norway.

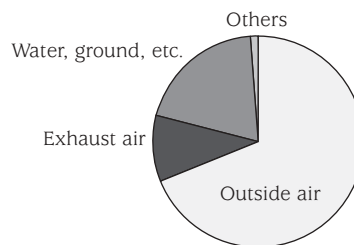


Figure 3: Heat pumps installed in Norway in 2000, by heat source.

Figure 3 shows the distribution according to heat source of heat pumps installed in 2000. Outside-air-source heat pumps form a large and increasing percentage of the total. Also, the percentage of ground and water source heat pumps is rising to the detriment of exhaust-air-source heat pumps.

Source: Roar Rose, NOVAP
Fax: + 47 63 84 16 70

REGULATIONS

Ongoing European standardisation relevant to heat pumps

This article presents a brief summary of current standardisation work on heat pumps. The main activities concern:

Safety of products

The IEC 665-2-40 standard "Safety of household equipment - Part 2-40: Specific requirements for electrical heat pumps, air conditioners and dehumidifiers" is currently being revised by the IEC 61 D Technical Committee, with the aim of integrating and completing the conditions of use of flammable refrigerants including a lower flammability limit and the maximum allowed charge of refrigerant.

Safety of systems

CEN TC 182 is revising the EN 378 standard "Refrigerating systems and heat pumps - Safety and environmental requirements" to ensure conformity with the European Pressure Equipment Directive. This standard comprises four parts, with Part 1 "Basic requirements, definitions, classification and selection criteria" being of particular importance as it deals with refrigerant charge limits according to the type and location of the system, occupancy of buildings and type of refrigerant (safe, flammable, toxic).

Tests of products

CEN TC 113 is revising the following current test standards for products:

- EN 255 "Air-conditioners, liquid chillers and heat pump with electrically driven compressor - Heating mode",
- EN 814 "Air-conditioners, liquid chillers and heat pump with electrically driven compressor - Refrigerating mode", and
- EN 12055 "Liquid chillers and heat pump with electrically driven compressor - Refrigerating mode - Definitions, tests and requirements".

These standards will be replaced by one standard specifying terms and definitions, test conditions for the rating and performance of air and water-cooled air conditioners, liquid chiller packages, and air-to-air, water-to-air, air-to-water and water-to-water heat pumps used for space heating and/or cooling. Parts 1 to 4 of the standard deal with tests of products at full load. Part 5 deals with tests of products at variable capacity. The standard does not apply specifically to heat pumps for sanitary hot water. A specific standard on this topic will be drawn up later, based on the current Part 4 of EN 255 "Requirements for equipment for sanitary hot water heating".

Conception and installation of systems

CEN TC 228 is working on a new standard project dealing with the "Conception and installation of heat pump heating systems". This committee has already drawn up standards for heating systems based on boilers and direct electrical heating. This new project should provide a common terminology and basic principles for the design and installation of heat pump heating systems. It should address not only the heat pump but also the heating distribution system and the heat source. *For more detail, see the article published in the European Heat Pump News Issue 2/2, June 2001.*

Energy consumption calculation

CEN TC 228 is working on the "Calculation method for the energy consumption of heating systems" project, which deals with heat pump heating systems.

Competence of personnel

The CEN TC 182 is also drawing up a draft standard prEN 13313 "Refrigerating systems and heat pumps - Competence of personnel", which establishes procedures for achieving and assessing the competence of personnel who design, install, test and commission, maintain, repair and dispose of refrigerating and heating systems.

Some EHPA members are involved in the standardisation work concerning heat pump products, systems or personnel.

Table 1: Abbreviations

| | |
|--------|--|
| IEC | International Electrotechnical Commission |
| CEN | European Committee for Standardisation |
| TC 182 | Technical Committee 182 "Refrigerating systems and heat pump - Safety and environment" |
| TC 113 | Technical Committee 113 "Heat pumps and air-conditioners" |
| TC 228 | Technical Committee 228 "Heating systems in dwellings" |

Catherine Ducruet
EDF, France
E-mail: Catherine.Ducruet@edf.fr

COUNTRY IN FOCUS: SWITZERLAND

Dr Hansueli Bruderer describes the Swiss approach to heat pumps, their sustainability and the outlook for the future. He is a member of the board of the AWP, delegate of the FWS and Swiss delegate to the EHPA.

The Swiss market - small but with a varied climate and different languages

Switzerland with around 7 million inhabitants, three main languages (German, French, Italian) and different habitable levels (200-2000 m above sea-level), with climates varying from moderate in low lying areas to very cold in mountainous areas, presents widely different conditions for heat pumps and heat pump marketing. Air-source as well as ground-coupled heat pumps have been used in Switzerland since the 1980s (vertical heat exchangers since 1981).

Market - current growth rate 10-12%

The AWP and FWS have collated heat pump statistics since 1980. Figure 1 shows a more or less stable period up to 1993 and a steadily growing heat pump market with an annual growth rate of 10-12% since 1994. Half are air-source and half are ground-coupled systems. Heat pump water heaters are not included in the statistics. In recent years the oil-fired and gas-fired boiler market has shown negative growth.

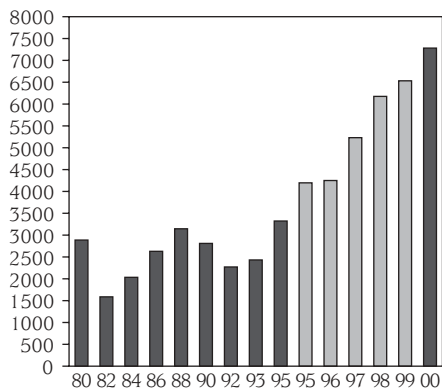


Figure 1: Annual heat pump sales in Switzerland 1980-2000 (source: FWS).

Swiss institutions

In Switzerland two associations, the AWP and FWS, promote the application of heat pumps. They are well coordinated and have made a substantial contribution to the positive image of heat pumps. They also acted as partners to national policy makers and the Swiss Federal Office of Energy, SFOE, when the *Energy 2000* and *Energy Switzerland* programmes were implemented. In Switzerland heat pump technology that uses

65-80% of renewable ambient heat is considered to be a renewable technology.

Quality assurance and market promotion

Nationally the main strategies focus on the quality and reliability of heat pumps and heat pump installations. Manufacturers have to set up an ISO 9001 quality management system and submit their heat pumps for independent assessment. The visible results are test bulletins issued by WPZ (Töss Heat Pump Test Centre), with number 28 in the series being published recently, and the "Gütesiegel", a quality label awarded by Germany, Austria and Switzerland to standardised and series-produced heatpumps. A quality label for drilling companies offering vertical heat exchangers is nearing completion.

Training has been and will remain an important strategy. The PENTA project has been set up as a coordinated programme for renewable energy technologies for planners and installers.

The third powerful strategy since 1992 is market promotion, which has influenced the

growing awareness, image and quantity of heat pumps. Direct, open advertisements and "open days" for heat pump installations have provided good publicity with heat pump owners sharing their personal experiences and opinions of the equipment. FWS staff members were responsible for organising the events. The open days, an example of which is shown in the picture, were held at sites all over Switzerland.

Future initiatives

By 2010 the FWS hopes to achieve a 50% market share of new installations (currently 35%) and 10% of replacements (currently 3%). Increasingly popular on the Swiss market are:

- Retrofit heat pumps for the replacement of gas or oil fired boilers, achieving a maximum output temperature of 65° C;
- Installations with "heating and cooling" modes (so far "heating only"), using natural cooling with ground coupled systems or reverse cycles for active cooling;
- Small systems of controlled air ventilation combined with a heat pump.

Figure 3 shows a small electronics company with an installation for heating and cooling using a ground coupled heat pump. This installation is an example of the numerous medium sized heat pumps with an output of 25-100 kW. Using the above targets, set in conjunction with Energy Switzerland, the sustainable use of heat pumps will be pursued during this decade.

Dr Hansueli Bruderer
Swiss delegate to the EHPA
E-mail: h.u.bruderer@satagthermotechnik.ch.



Figure 2: Heat pump open days in Switzerland



Figure 3 Swiss commercial building, heated and cooled with a heat pump.

The roles of Swiss key institutions

AWP, the Swiss Heat Pump Association, established in 1980, is the association for leading Swiss heat pump manufacturers and suppliers. Since 1995 the AWP and FWS have published technical standards for products, installation and maintenance, as well as statistics relating to the number of heat pumps sold. AWP members promote the use of high commercial standards for their heat pumps. President AWP: Urs Gräflein, c/o AWP, Konradstr. 9, CH-8023 Zürich; info@awp.ch.

The membership of the FWS, the Swiss Association for the Promotion of Heat Pumps (established 1993) includes power utilities, engineers and installers, manufacturers and suppliers, local and national authorities and other associations. The FWS acts as a partner to the national office of energy and is concerned mainly with the marketing of heat pumps. President: Dr. Peter Bieri, member of Swiss Parliament, c/o FWS; www.fws.ch.

In 1991 the SFOE, the Swiss Federal Office of Energy devised the well-known national *Energy 2000* programme, which has been superseded by *Energy Switzerland*. The programme promotes sustainable energy, complies with the Kyoto targets, and supports research projects on heat pumps. Contact: Fabrice Rognon; fabrice.rognon@bfe.admin.ch.

The deadline for the December 2001 issue is **15 October 2001**.

Publisher: European Heat Pump Association
Secretariat: Mr Axel Lehmann
FIZ Karlsruhe
PO Box 2465
D-76012 Karlsruhe
Tel.: + 49-7247-808351
Fax: + 49-7247-808134
E-mail: ale@fiz-karlsruhe.de
Internet: http://www.ehpa.org

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