

HEAT PUMP NEWS

Saving Energy

HPA
HEAT PUMP ASSOCIATION

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THE HEAT PUMP MARCHES ON

Every issue of HPN has reported a higher level of acceptance for heat pumps, and the headlines continue in both commercial and residential applications.

Residential

Part L of building regulations now specifies heat pumps and types in detail.

VAT has been reduced on heat pumps both ground and air source.

Commercial

Part L of building regulations

Carbon Trust accepts ground source and gas engine heat pumps onto ETL (the developments are explained in the VAT article on page 3).

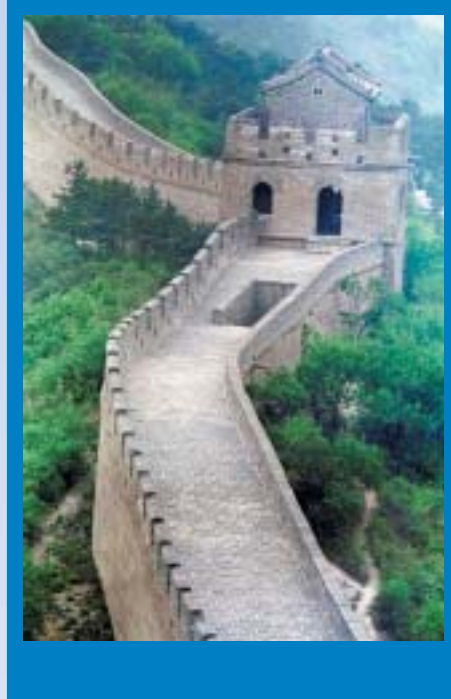
Behind these headlines is the recognition of the core benefit of the heat pump — energy efficiency. Whilst some technologies are striving to improve efficiency by climbing towards 90 - 95%, heat pumps are already delivering 250 - 300% and can better that in the right application. At a time when progress towards the national energy goal is becoming ever harder, the efficiency and energy multiplier characteristics of heat pumps are most welcome, and are at last gaining the recognition they deserve. The HPA will strive to continue the pace of progress!

Tony Bowen, President, HPA

Heat pumps at IKK

A symposium on 'Refrigeration, air conditioning and heat pump technology innovations for reducing CO₂ emissions' is being organised by IZW at IKK 2005 Hannover — the International Trade Fair Refrigeration, Air Conditioning, Ventilation. The event will take place at the Hannover exhibition grounds from 11 a.m. to 6.30 p.m. on 1 November.

More information and downloads can be found on the following link:
http://press.nuernbergmesse.de/en/_ikk/25.pm.2151.html



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Eaton-Williams' sister company supplies water source heat pumps to China

Eaton-Williams is very active in China working with its partner Forgend Technologies who manufacture the CTX and IPAC air handlers. Now its sister company Mammoth (Shanghai) Air Conditioning Ltd has entered the market by securing a contract to supply water source heat pumps for the Nanjing International Plaza project in China.

Commenting on the Nanjing project, Peter Dewdney, group marketing manager for Eaton-Williams says, "China is an important market for Eaton-Williams and with our sister company Mammoth we are well placed to meet the increasing demand for cooling and heating solutions."

The Nanjing International Plaza project is a 4.5 million sq ft complex consisting of offices, hotels and apartments centred round a shopping mall. The Nanjing project is currently the largest of its type in China and will be using Mammoth water source heat pumps throughout. Unwanted rejected heat from the development's massive interior zones will be

recovered for heating exterior zones during the heating season. The rejected heat will also be used for pre-heating domestic hot water for the project's hotels.

Energy-saving air conditioning systems are frequently specified in many projects in China and Mammoth has an extensive portfolio of products that can provide energy efficient solutions. By using water source heat pumps end users also save on capital investment and operating costs as the systems address heating and cooling at low costs at any time of the year.



Energy saving for London hotel

The installation of seven Mitsubishi Electric WR2 heat recovery air conditioning units into the Zetter Hotel in Clerkenwell is helping the stylish conversion provide the right environment for its guests, while using the natural underground lake deep below the city streets as a cooling source to save on energy consumption.

The air conditioning system, which was supplied by Mitsubishi Direct's Bristol office, was put together by a design team from engineering consultancy, Buro Happold and Gratte Manly Mechanical Services and installed by J C W Air Conditioning of Bristol. It was selected as the option that not only allowed for a sustainable and energy efficient design, but also avoided losing valuable roof space that has now been used for penthouse suites.

"If we had installed standard air conditioning units we would have lost at least one penthouse suite, which earns valuable revenue for the hotel," explained Todd Billo, maintenance manager at the 59-bedroomed hotel.

The refurbishment was designed by architects Chetwood Associates, using sustainable materials and environmentally responsible principles with the main atrium providing natural ventilation and the air conditioning cooled by water pumped from the bore-hole which sinks 130m below the building.



The 19th Century warehouse in the heart of Clerkenwell is within walking distance of Sadlers Wells, the Barbican, Smithfields, St Pauls and the City and has a modern Italian restaurant on the ground floor with stylish, comfortable bedrooms above.

The bedrooms include seven rooftop studios with patios providing panoramic views over London. All rooms have giant sash windows and are reached via the dramatic five-storey atrium.



The refurbished building will probably need very little heating requirement, although this is also a feature of the versatile and energy efficient WR2 system, which can supply simultaneous cooling and heating to up to 16 individual indoor units from each condensing unit, which are sited in small service rooms on each floor.

Along with this capability to free up vital roof space, the WR2 is also 'unique' in its ability to link to a building's water loop and transfer heating or cooling energy between them. This allows the units to offer efficient double heat recovery, producing heat recovery from indoor units on the same refrigerant circuit in addition to using the water circuit to transfer energy between different WR2 circuits.

The 18-month conversion project has retained many of the building's original features and scars while blending the traditional and the modern, to create an unpretentious urban space in which to sleep, eat and meet.

The building's large sash windows for

example, are a dominant feature of every room and particularly on the south side of the building, this can leave rooms hot as the guests walk in, so it is vital that the air conditioning is able to cool quickly to a comfortable level.

The air conditioning is controlled by Mitsubishi Electric's G50 system which links to the overall BMS, although each room has an individual controller. When a guest enters the room and places their VIN card (room key) in the slot, which controls all lights and services, the air conditioning will come on and will automatically switch off when the room is vacated.

The system is also connected to sensors on the sash windows so that if they are opened, the air conditioning will switch off to stop energy being used when it is not needed.

"The system has been so well set up that it practically runs itself and we are now fine tuning it so that we can get maximum efficiency," says Mr Billo adding that the user-friendly G50 is easy to pick up and understand.

Water has figured largely in the history of Clerkenwell, whose name derives from a well used to bring water up to medieval London from the underground reservoir. In addition to using this water to take away excess heat from the air conditioning systems, the Zetter Hotel also filters it and offers it to guests in the form of still or sparkling bottled spring water.

VAT — HM Revenue & Customs boost heat pumps

HMRC has now granted a reduced rate of VAT (5%) to two types of heat pumps — ground source and air source. Ground source VAT reductions were included in an announcement during 2004, but air source joined them only after the last budget statement. Good news for heat pumps.

Some clarification of the terms applicable to VAT reduction has been necessary and HPA has succeeded in clarifying matters with HMRC. Units benefiting are, therefore, as follows, all for application in 'residential accommodation or buildings intended for use solely for a

relevant charitable purpose':
Ground to water, ground to air
Air to water, air to air.

Please note that only those products installed with the primary purpose of providing heating to a dwelling are eligible for the reduced rate of VAT. Cooling **only** units do not qualify. A 'heating' heat pump may have the potential to cool during short periods of the year, but HMRC will quite correctly seek to establish that heating is the prime purpose of the installation.

Specifiers and installers should use this valuable concession wisely and be careful not to try to abuse it!

Double capacity from Toshiba outdoor units

The new Toshiba inverter driven heat pump outdoor unit is said to be so efficient that it can produce the same capacity with a single fan configuration as others can with a double fan, double height outdoor unit. The new unit incorporates new fan designs that 'save power and reduce noise even further'.

These compact Digital Inverter split system condensing units are lighter and as much as 40% smaller than previous Toshiba models, 'which were already smaller than the alternative choices'.

The 'secret' of the design is a new 3 row multiple tube heat exchanger, which increases heat exchange capacity over traditional two or single row designs.

The compact system uses a high efficiency DC twin rotary compressor. The capacity ranges are 5.0 to 12.5kW in cooling and 5.6 to 14kW in heating. The system is capable of functioning in ambients down to -15°C.

A single phase power supply is required.

Heat pumps go on holidays

An increasing number of heat pump installations can be found in leisure and holiday applications where the owners are conscious of the need to save energy and money.

Just such a case was a Carrier Xpower heat pump split system,



which has been installed by Domair International in a holiday rental unit in a converted water mill in Aldershot, Hampshire.

The rooms are open to rafter height and the construction is predominantly timber, so a substantial amount of heat is retained. The Carrier Xpower high wall mounted unit located in the bedroom heats the space quickly and quietly. It uses an electronic inverter drive system, which is claimed to be more than 40% efficient than 'conventional' systems.

It operates from the mains single phase supply and can be run on a time clock to provide even more energy saving.

This holiday home is almost fully let all year round and the heat pump system can provide economic supplementary heating in winter.

Carrier Xpower systems usually benefit from tax advantages under the government's Enhanced Capital Allowance (ECA) scheme.

Read your regulations

Many hours have been devoted by HPA members to the updating of the new building regulations. The Government has set the target of January 2006 as the introduction of these new laws, the objective being to tighten specification and reduce heat losses and heat gains with a consequent reduction in energy consumption and CO₂ emissions. ADL 1 and ADL 2 (Advisory Document L Parts 1 and 2) relates to residential and commercial properties. Both now include more comprehensive descriptions of heat pump types and their design requirements, as well as guideline efficiencies. It now looks as if these efficiencies will be less demanding than the industry recommends, but they nevertheless signal clearly to all engineers and architects using the guide that heat pumps offer real design options.

ADC 1 and ADC 2 are still in draft form but will, once published, have a significant effect on market perceptions of the heat pump. HPA can advise on progress as the documents creep towards publication.

Daikin's water cooled VRV equipment gains ECA accreditation

Daikin Airconditioning UK Ltd's water cooled VRV heat pump / heat recovery air conditioning equipment, launched earlier this year, is now included in the 'heat pump — water source split and multi split' category of the Carbon Trust's Energy Technologies List. The water cooled version therefore joins the entire Daikin R410A and R407C VRV and VRV product ranges in qualifying for full ECA tax relief.

Daikin is currently the only manufacturer to have a water cooled VRV system accepted for ECA benefits and the inclusion of the water cooled VRV brings the company's total number of units under the 'heat pumps' category to 191, representing some 25% of all heat pump products listed.

The Daikin water cooled VRV also

qualifies further under the 'increased eligibility scheme', whereby eligible product COPs and EERs will be required to rise from 3.2 to 3.4 and 2.8 to 3.0 respectively by August 2006.

Daikin HRV heat recovery ventilation units are also now included in the 'air to air energy recovery' section of the Energy Technologies List.

"The inclusion of these important Daikin products is a further endorsement of the company's commitment to energy efficiency. This enables the total investment cost to be included in the building services project budgeting of profitable commercial organisations for ECA," said the company.

Facts about heat pumps

Why do heat pumps now form an essential part of the solution for reducing energy consumption and reducing carbon emissions. Here are some questions and answers outlining the essential facts.

Q What is a Heat Pump?

A It is an efficient and space saving means of heating a wide range of premises. It can also provide cooling to these premises.

Q How does it work?

A The vast majority of Heat Pumps work on the same principle as the domestic refrigerator utilising a vapour compression cycle, but for heating the Heat Pump utilises the 'hot end' of the process. The vapour compression process utilises low grade heat that is normally too cool for human or process requirements and lifts the same quantity of energy to a higher temperature that is suitable for human comfort.

Q Why is this remarkable?

A The thermodynamic cycle occurs at constant energy content throughout even though the temperature has been increased from say 5°C to say 35°C. A refrigerant is utilised in the cycle to act as the transfer medium and the only prime energy required is the energy to circulate the refrigerant.

Q What sort of efficiencies can be produced?

A Depending on the application and type of Heat Pump utilised efficiencies of 300% to 500% are normal. When dealing with Heat Pumps efficiency is known as Coefficient of Performance (COP), so the COPs for the above example would be 3 to 1 and 5 to 1.

Q How do you calculate a COP?

A In its simplest form this relates to HEATING OUTPUT divided by the POWER INPUT. E.g. with a COP of say 4 to 1 the HEATING OUTPUT relates to 4kW and the POWER INPUT 1kW.

(Note! Remember that COPs are instantaneous measurements of performance and are usually quoted by manufacturers to an international standard. COPs will vary according to the air or water entering the heat pump and with the temperature of the air or water being treated by the heat pump.)

Q So they save energy but what about CO₂ emissions?

A Heat Pumps emit considerably less CO₂ to the atmosphere than gas or oil fired heating systems so they are environment friendly and the low grade heat source utilised is considered to be a renewable energy source.

Q Can money be saved as well?

A Yes of course. Due to the dynamic nature of Heat Pumps their capital cost is higher than conventional heating systems, however, the savings delivered in energy efficiency allows for very low operating costs. When utilised in commercial buildings, that also require cooling, additional cost benefits occur as there is no need to expend further capital on a second system.

Q What types of Heat Pump are available?

A Heat Pumps are normally classified by their heat source and means of delivery, e.g. AIR to AIR means air is used as the low grade heat source and air is also how the heat is delivered to the space. The main types of Heat Pumps are thus:

AIR to AIR — extensively used in commercial buildings as reverse cycle heat pumps (those that can provide both heating and cooling).

AIR to WATER — used in many applications such as in conjunction with fan coil units in commercial buildings, for heating swimming pools, and for providing domestic hot water.

WATER to AIR — can use wells or boreholes, but can also be configured as many units connected together on a common closed water loop to enable energy transfer from hot to cold points in a building.

GROUND to AIR — Using the stable ground temperature to provide the heat source with warm air being delivered to the space.

GROUND to WATER — As above but utilised with underfloor heating systems, medium temperature radiators or fan coil units.

In addition to this products may be single package, split package, ducted, rooftop, part of a central system, zone system, or stand alone.

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How to Join:

The Heat Pump Association is dedicated to the implementation of applying the available technology of heat pumps and will achieve this goal with the aid of new members joining the already committed companies.

Therefore any company that would like to receive information on how to join the HPA and share in the continuing benefits of all our members, please contact the HPA secretary Terry Seward:

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or by fax back form below.



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Attention of
Terry Seward HPA Secretary

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