

Special points of interest:

- * Heating distribution systems
- * Domestic hot Water
- * Building regulations and Part L Compliance
- * Code for Sustainable Homes
- * Grant Schemes

Key issues when specifying heat pumps.

Introduction

The Government has confirmed its intention for all new homes to be zero carbon by 2016 with a major progressive tightening of the energy efficiency building regulations - by 25% in 2010 and by 44% in 2013 - up to the zero carbon target in 2016. This drive will highlight the need for renewable technologies such as ground source heat pumps, to be effectively integrated into new buildings. The DTI's report 'The potential for Micro-generation' suggests that 28,000 heat pumps will be installed by 2012, a ten-fold increase on current volumes.

The interest in heat pump technology is therefore in-

creasing and to provide an effective solution it is important that the key issues on how these systems are integrated into buildings are understood.

Heat pumps ideally suit well insulated, new buildings with an underfloor heating distribution system throughout, with land to bury the ground arrays. They can also be used in other applications; however the benefits may be reduced.



The drive to zero-carbon by 2016

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Expertise, Service, Quality

Heating Distribution Systems.

To get the most efficient operation from a heat pump it's important that the outlet temperature is kept as low as possible, this lends itself to underfloor heating distribution systems and when used, in conjunction with

these, efficiencies of up to 400% can be achieved. Radiator systems can be used however due to the higher temperatures required the efficiency will drop to approximately 300%. Radiator systems would also need to

be oversized as the maximum continuous temperature from a heat pump is generally around 50°C.

With underfloor systems the ideal installation is to mount the underfloor in screed.

Heating Distribution Systems.

Using the screed as a thermal mass allows the occupier to run the heat pump on off-peak tariffs further reducing the running costs. For first floor applications the ideal building construction is beam and block with the underfloor and screed laid on top. For suspended floors a dry/sand screed can be used either between or over joists, however with these systems structural and height considerations need to be taken into account. It may also be necessary to run the heat pump at a higher

temperature to drive the heat through the overlying chipboard and final floor



Screeding an underfloor system

finish, therefore reducing its efficiency.

If heat emission plates are used off-peak tariffs cannot be effectively used as there is no thermal storage and again higher temperatures may be required.

“The maximum temperature from a heat pump is generally around 50°C, and this will reduce the operating efficiency of the heat pump.”

Domestic Hot Water

All heat pumps can produce domestic hot water; however how well they do this depends on your expectations. When there is a demand for hot water the heat



Heat pumps can produce hot water, however there are important considerations.

pump switches from space heating mode to hot water mode and the heat pump outlet temperature is increased. The maximum temperature from a heat pump is generally around 50°C, and this will reduce the operating efficiency of the heat pump. This hot water is generally piped through an indirect coil mounted in a separate hot water tank and hence the expected tank temperature will be around the 45-48°C range. The use of an immersion heater to increase the temperature may seem to be the ideal solution, however in prac-

tice the immersion heater will take the load and the heat pump will never see a demand.

Due to the additional load on the ground it is also necessary to increase the number of ground arrays.

The most cost effective way of producing DHW is to use solar thermal backed up with an off-peak immersion heater. These systems can provide up to 75% of a household's DHW free of charge.

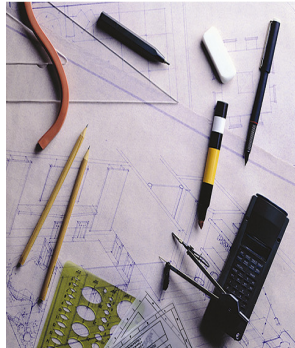
Building Regulations and Part L Compliance.

In 2006 the UK Building Regulations changed and one of the main requirements for meeting the energy efficiency criteria of the regulations (Part L, in England and Wales, Part J in Scotland) is now based on CO₂ emissions from the proposed building.

SAP is the Government's standard methodology for assessing the energy consumption in new domestic dwellings. The latest version of SAP is SAP 2005. The SAP scale runs from 1 (poor) to 100 (excellent) and is based on estimated annual energy use for space heating, domestic hot water, ventilation and internal fixed lighting. A SAP of 100 now represents zero energy cost for these items. It can be above 100 for dwellings that are net exporters of energy.

Ground source heat pumps have significantly lower CO₂ emissions than traditional fossil fuel heating systems due to their high efficiencies. Using figures produced by the DTI in conjunction with BRE, a ground source heat pump can show up to a 43% saving in CO₂ over gas and a 57% saving over oil.

SAP 2005 now uses a dwelling's CO₂ emissions as a standard methodology for assessing the energy consumption in new domestic dwellings and proving compliance with Part L. The lower the CO₂ emission the more energy efficient the building is. Installing a



ground source heat pump will increase a building's SAP rating and help the building meet current Building Regulations.

Indeed, such is the CO₂ reduction, there might be an opportunity, in some cases, to downgrade the insulation specification and still achieve an acceptable CO₂ emission rate. However, this tactic is not recommended simply because any increase in the property's heat load will result in a higher flow temperature, a less efficient heat pump and higher running costs. Later editions of the SAP software are likely to demonstrate even higher efficiencies for heat pumps.

“Ground source heat pumps have significant lower CO₂ emissions than traditional fossil fuel heating systems”

Code for Sustainable Homes.

On 13 December 2006, the Code for Sustainable Homes - a new national standard for sustainable design and construction of new homes was



Jubilee Wharf—Penryn

launched. The Code measures the sustainability of a new home against categories of sustainable design, rating the 'whole home' as a complete package. The Code uses a 1 to 6 star rating system to communicate the overall sustainability performance of a new home. The Code sets minimum standards for energy and water use at each level and, within England, re-

places the EcoHomes scheme, developed by the Building Research Establishment (BRE). The Code for Sustainable Homes is thought to be a stepping stone towards all new homes being zero carbon by 2016. It is expected the Code may become mandatory in 2008.

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Due to the lower CO₂ emissions from a heat pump it can help meet the mandatory reductions set out within the Code for energy reduction.

The code will provide valuable information to home buyers, and offer builders and Architects a tool with which to differentiate themselves in sustainability terms.

Code Levels	Minimum Percentage reduction in Dwelling Emission Rate Over Target Emission rate (as per SAP 2005)
Level 1 (*)	10%
Level 2 (**)	18%
Level 3 (***)	25%
Level 4 (****)	44%
Level 5 (*****)	100%
Level 6 (*****)	Zero Carbon

Code for Sustainable homes CO₂ levels

Grant support for Kensa Heat Pumps

The current main scheme for domestic dwellings is the Low Carbon Buildings Programme. The programme provides grants for the installation of microgeneration technologies in a range of buildings, to include households, community organisations, public, private and the non-profit sectors. The programme is managed for BERR by the Energy Savings Trust and householders apply direct. It gives access to a grant of 30% up to a maximum of £1200 for heat pump technology. There is a total limit of £2500 for all renewable technologies installed at the same address. Kensa are fully accredited under the Low Carbon Buildings Programme and hence installing a Kensa system

enables full access to the grant scheme.

Other schemes are available from Energy Suppliers; currently these are called EEC2 and will shortly change to CERT. The CERT (Carbon Emission Reduction Target) 2008-2011 programme will commence in April 2008 and the government proposes the total CERT obligation to be a lifetime saving of 42 million tonnes of carbon (MtC). These grants are available to everyone including housebuilders with single or communal schemes. The grant amount will depend on a number of factors, such as the size of the property, the fuel being displaced and the intended user of the property. As of January 2008, the



precise CERT proposals have just been published and the energy companies are now developing schemes for the measures to be favoured. However from initial talks the grants will be significant. Kensa is in detailed discussions with several energy companies This grant funding will be available for heat pumps commissioned after April 1 2008.

For more information on any of the above or other issues concerning ground source heat pumps please visit our website www.kensaengineering.com or phone on 01392 826022.

We're on the web!
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